DOCUMENT RESUME

ED 296 728 IR 052 384

AUTHOR	Saracevic, Tefko
TITLE	A Course in Information Consolidation. A Handbook for Education and Training in Analysis, Synthesis, and Repackaging of Information. Preliminary Version.
INSTITUTION	United Nations Educational, Scientific and Cultural Organization, Paris (France). General Information Programme.
REPORT NO	PGI-86/WS/14
PUB DATE	86
NOTE	142p.
AVAILABLE FROM	Division of the General Information Programme, Unesco, 7, place de Fontenoy, 75700 Paris, France.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052) -- Guides - Non-Classroom Use (055) -- Reports - Descriptive (141)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Administration; *Course Content; Course Descriptions; *Curriculum Development; Developing Nations; Documentation; *Information Science; *Information Services; *Library Science; Postsecondary Education; Professional Continuing Education; *Users (Information)
IDENTIFIERS	*Information Consolidation

ABSTRACT

The course presented in this handbook has four major objectives: (1) to define the nature and environment of information consolidation and describe its role and potential benefits; (2) to survey characteristics of users, methods for user studies, and procedures for marketing and dissemination of information consolidation products and services; (3) to provide a description of and training in various methods for producing information consolidation products for professionals and policy makers; technicians, workers, and communicators/intermediaries; and community groups and mass/popular use; and (4) to provide an overview of elements involved in the establishment and management of information consolidation units and a perspective for information consolidation in different environments. Directed primarily at instructors, educational decision-makers and administrators, especially in developing nations, the handbook begins with a brief description of the course and definitions of information consolidation. An introduction then provides a general description of the role of information in development and the associated information problems that serve as a framework for information consolidation activities. The course description--the major part of the document--is presented in three parts: (1) the design aspects of the course, including its rationale, purpose and objectives, and structure; (2) the course syllabus, which is presented in 13 chapters, each corresponding to a topic treated in the course; and (3) implementation, which includes the organization, presentation, and evaluation of the course. The appendix provides a selective list of organizations in different regions of the world engaged in information consolidation to serve as possible contacts. (29 references) (CGD)

ED296728

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PGI-86/WS/14

A course in information consolidation: a handbook for education and training in analysis, synthesis and repackaging of information (Preliminary version)

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
C.Coudert-Schklowski

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

General Information Programme and UNISIST

United Nations Educational,
Scientific and Cultural Organization

Paris, 1986

IR052384

BEST COPY AVAILABLE

PGI-86/WS/14
Paris, May 1985

A COURSE IN INFORMATION CONSOLIDATION

A Handbook for education and training in
analysis, synthesis and repackaging of information
(preliminary version)

prepared by
Tefko Saracevic

General Information Programme and UNISIST

United Nations Educational,
Scientific and Cultural Organization

Recommended catalogue entry :

Saracevic, Tefko
A Course in information consolidation : a handbook
for education and training in analysis, synthesis and repackaging
of information (preliminary version) / prepared by Tefko Saracevic
[for the] General Information Programme and UNISIST. - Paris :
Unesco, 1986. - ix, 128 p.; 30 cm. - (PGI-86/WS/14)

I - Title
II - Unesco. General Information Programme and UNISIST

© Unesco, 1986

FOREWORD

The present handbook for a course in analysis, synthesis and repackaging of information represents an important step in the effort of Unesco, through its General Information Programme, to promote the consolidation and dissemination of information for development. The background, objectives and structure of the document are presented in the author's preface which follows.

The handbook was prepared for Unesco by Professor Tefko Saracevic, formerly associated with the School of Library and Information Science of Case Western Reserve University (Cleveland, Ohio, USA) and presently at the School of Communication, Information and Library Studies, Rutgers University (New Brunswick, New Jersey, USA). In view of the relatively small amount of training work which has been carried out in the area of information consolidation, it has been felt advisable to issue these guidelines in preliminary form, without subjecting them to prior international review.

Readers, particularly those involved in information science training programmes, are invited to review and test this handbook in practical educational situations and to address their comments and suggestions to :

Division of the General Information Programme
Unesco
7, place de Fontenoy
75700 Paris
France

Additional copies of the document can be obtained by writing to the same address.

TABLE OF CONTENTS

PREFACE
Origin 1
Definitions 1
Essential Features 2
Purpose and Objectives of the Handbook 2
Audience for the Handbook 3
Companion Publications 4
Organization of the Handbook 5

INTRODUCTION

PART I. DESIGN

Chapter I-1 RATIONALE AND THE NEED FOR THE COURSE
Barriers to Use of Information 8
Solutions to Information Barriers 9
Summary 10

Chapter I-2 PURPOSE, OBJECTIVES AND ORIENTATION OF THE COURSE
Purpose 12
Objectives 12
Emphasis and Orientation 13

Chapter I-3 STRUCTURE OF THE COURSE
Approach 14
Areas and Topics 14
Outline of the Course 16

PART II. CONTENTS

AREA A: DEFINITION AND ENVIRONMENT

Chapter II-1 FIRST TOPIC: DEFINITION AND SOCIAL ROLE OF INFORMATION CONSOLIDATION
Instructional Objectives and Rationale 17
Outline of Topic 1 17
Narrative of Important Points in Topic 1 18
Teaching Suggestions 20

Chapter II-2 SECOND TOPIC: PURPOSE AND FRAMEWORK OF INFORMATION CONSOLIDATION
Instructional Objectives and Rationale 22
Outline of Topic 2 22
Narrative of Important Points in Topic 2 23
Teaching Suggestions 27

AREA B: BENEFITS AND USERS

Chapter II-3 THIRD TOPIC: VALUE AND BENEFITS OF INFORMATION CONSOLIDATION
Instructional Objectives and Rationale 28
Outline of Topic 3 28
Narrative of Important Points in Topic 3 29
Teaching Suggestions 33

Chapter II-4 FOURTH TOPIC: USERS AND USER STUDIES
Instructional Objectives and Rationale 36
Outline of Topic 4 36
Narrative of Important Points in Topic 4 37
Teaching Suggestions 44

AREA C: INPUTS

Chapter II-5 FIFTH TOPIC: SELECTION AND EVALUATION OF INFORMATION
Instructional Objectives and Rationale 45
Outline of Topic 5 45
Narrative of Important Points in Topic 5 46
Teaching Suggestions 53

AREA D: PROCESSING METHODS AND TECHNIQUES

Chapter II-6 SIXTH TOPIC: OVERVIEW OF THE METHODS AND PRODUCTS FOR INFORMATION CONSOLIDATION
Instructional Objectives and Rationale 54
Outline of Topic 6 54
Narrative of Important Points in Topic 6 55
Teaching Suggestions 59

Chapter II-7 SEVENTH TOPIC: REVIEWS AND RELATED PRODUCTS
Instructional Objectives and Rationale 60
Outline of Topic 7 60
Narrative of Important Points in Topic 7 61
Teaching Suggestions 65

Chapter II-8 EIGHTH TOPIC: TECHNICAL WRITING AND POPULARIZATION FOR MASS USE
Instructional Objectives and Rationale 66
Outline of Topic 8 66
Narrative of Important Points in Topic 8 67
Teaching Suggestions 71

AREA E: OUTPUTS

Chapter II-9 NINTH TOPIC: PACKAGING MEDIA AND FORMATS
Instructional Objectives and Rationale 72
Outline of Topic 9 72
Narrative of Important Points in Topic 9 73
Teaching Suggestions 75

Chapter II-10 TENTH TOPIC: DISSEMINATION OF INFORMATION CONSOLIDATION PRODUCTS
Instructional Objectives and Rationale 82
Outline of Topic 10 82
Narrative of Important Points in Topic 10 82
Teaching Suggestions 86

AREA F: MANAGEMENT

Chapter II-11 ELEVENTH TOPIC: MARKETING OF INFORMATION
Instructional Objectives and Rationale 88
Outline of Topic 11 88
Narrative of Important Points in Topic 11 89
Teaching Suggestions 92

Chapter II-12 TWELFTH TOPIC: MANAGEMENT OF AN INFORMATION CONSOLIDATION UNIT
Instructional Objectives and Rationale 93
Outline of Topic 12 93
Narrative of Important Points in Topic 12 94
Teaching Suggestions 101

AREA G: PERSPECTIVE

Chapter II-13 THIRTEENTH TOPIC: SUMMARY OF REQUIREMENTS AND PERSPECTIVE FOR INFORMATION CONSOLIDATION IN GIVEN ENVIRONMENT
Instructional Objectives and Rationale 103
Outline of Topic 13 103
Narrative of Important Points in Topic 13 104
Teaching Suggestions 108

PART III IMPLEMENTATION

Chapter III-1 ORGANIZATION AND PRESENTATION OF THE COURSE
Library and Information Science Curriculum 109
Continuing Education 110
Instructors: Preparation and Teaching 111

Chapter III-2 COURSE EVALUATION
Levels or Steps in Evaluation 112
Evaluating Reaction of Participants 113
Evaluating Learning Acquired 114
Evaluating Behavior Change 115
Evaluating Course and Program Results 117

REFERENCES 119

APPENDIX 122

LIST OF FIGURES

Fig. 1	Processes in information consolidation	26
Fig. 2	Value of information in decision making and problem solving	31
Fig. 3	Relation between public knowledge, consolidated information and users	32

LIST OF TABLES

Table 1	Outline of the course Information Consolidation	16
Table 2	Potential benefits that may be derived from use of consolidated information	34
Table 3	Examples of information consolidation	76
Table 4	Examples of information consolidation products in different media	79

PREFACE

Origin

This Handbook is a direct outgrowth of the expression of needs and recommendations contained in the final reports of the following meetings convened by the General Information Programme, Unesco:

1. First Meeting of the UNISIST Working Group on Information Analysis Centers. Unesco House, Paris, 3-5 November 1975 [1].

2. Symposium on Information Analysis and Consolidation (second meeting). Colombo, Sri Lanka, 12-15 September, 1978 [2].

3. Third Meeting of the UNISIST Working Group on Information Analysis and Consolidation. Kuala Lumpur, Malaysia, 12-16 September, 1983 [3].

Recommendations from a number of other meetings were instrumental as well, most notably:

4. United Nations Conference on Science and Technology for Development. Vienna, Austria, 1979 [4].

5. International Symposium on Harmonization of Education and Training Programmes in Information Science, Librarianship, and Archival Studies. Unesco House, Paris, 8-12 October, 1984 [5].

These reports deal (among others) with information needs in developing countries in general, and to a large extent with a specific need to provide information appropriate in contents and form for various types of audiences in particular. The notion of consolidated information as defined below was recommended as one way to satisfy this specific need. The key idea is to provide information in ways which will increase its potential for utilization by a broad array of users.

Taking the recommendations and ideas for appropriate and consolidated information as its framework, this Handbook concentrates on a course directed toward creation of knowledge and competencies needed for the professional practices involved in production and dissemination of consolidated information.

Definitions

At the Unesco Symposium on Information Analysis and Consolidation held 12-15 September 1978 in Colombo, Sri Lanka [2] the following definitions were established:

INFORMATION CONSOLIDATION ACTIVITIES is used to define the responsibilities exercised by individuals, departments, or organizations for evaluating and compressing relevant documents in order to provide definite user groups with reliable and concise new bodies of knowledge. Individuals or groups of individuals performing information consolidation activities would each constitute an INFORMATION CONSOLIDATION UNIT (ICU).

A related, but more elaborate definition was offered by Tefko Saracevic in Consolidation of Information. A Handbook on Evaluation, Restructuring and Repackaging of Scientific and Technical Information. [6]:

CONSOLIDATED INFORMATION is public knowledge specifically selected, analyzed, evaluated, and possibly restructured and repackaged for the purpose of serving some of the immediate decisions, problems, and information needs of a defined clientele or social group, who otherwise may not be able to effectively and efficiently access and use this knowledge as available in the great amounts of documents or in its original form. The criteria for selection, evaluation, restructuring, and repackaging of this knowledge are derived from the potential clientele.

These are the definitions of information consolidation used as the basis for all the concepts and descriptions in this Handbook.

Essential Features

The mentioned reports prominently discuss two essential features of information consolidation:

1. User orientation, and
2. Cooperation between subject specialists and information specialists

These are fundamental requirements for success of information consolidation. Subsequently, these two features are the focal or underlying theme of the course as a whole, discussed or aluded to in a number of topics.

Purpose and Objectives of the Handbook

The general purpose of this Handbook is to encourage institutions and organizations concerned with education and training in library and information science to incorporate a course in information consolidation into their programs, be they regular academic programs or continuing education programs for

information professionals. The need to offer such a course is particularly relevant to developing countries, where the information needs of definite user groups are often not met because of the lack of appropriate information products and services.

The objectives are:

1. To provide a detailed description and syllabus for a course in information consolidation which will make it easier to incorporate, adapt and teach such a course within an existing curriculum or a continuing education program.

2. To outline the means and methods for implementation of such a course.

3. To provide a general reading list, and suggestions for use in teaching of the course and/or in adapting it to specific situations and applications.

The intention is not to suggest copying the course exactly as outlined in the Handbook, but to provide enough materials that will make it easy to adapt the course to given environmental circumstances and yet preserve the basic concepts and principles of information consolidation which are valid for all environments and circumstances.

But there is even a broader intent above and beyond the course:

...to stimulate thinking about information consolidation services in general,

...to encourage concerns about neglected information needs of definite user groups, needs which could be met by information consolidation products and services,

...to contribute to specific definitions of information consolidation methods and issues.

Audience for the Handbook

Two primary audiences are envisioned for the Handbook:

1. Instructors in library and information science (be they in the framework of academic or continuing education programs) for use in designing and teaching a course in information consolidation;

2. Educational decision makers and administrators for use in making policy and decisions pertaining to curricula and continuing education programs in library and information

science.

The secondary audiences are:

3. Scholars and analysts concerned with educational issues in library and information science in general, and information consolidation approaches in particular, for use as background material in their studies or for basis or improvements in information consolidation;

4. Information professionals concerned with practical and managerial aspects of information consolidation for use as a checklist in development or evaluation of practical applications;

5. Students engaged in the study of or training for information consolidation for use as a table of contents of what there is to know and consider, and for examples.

Companion Publications

General Information Programme, Unesco, has published a number of handbooks and reports on information consolidation. These are directly relevant to this Handbook; they are cited in connection with various course topics and they could be used as texts, readings and examples in a course on information consolidation.

Among these are the three reports from meetings already cited at the outset of the Preface [1-3] and in addition:

*Saracevic, T. and Wood, J. A Handbook on Evaluation Restructuring and Repackaging of Scientific and Technical Information [6].

*Marumdar, A. Consolidation of Information: Biogas Handbook [7].

*Rastogi, T. Consolidation of Information: Windpump Handbook [8].

*Tata Energy Research Institute. Consolidation of Information: Cooking Stoves Handbook [9].

*Tata Energy Research Institute. Biogas Technology - A Manual for Decision Maker [10].

*Tata Energy Research Institute. Biogas Technology: A Manual for Extension Worker [11].

*Seetharama, S. Guidelines for the Establishment of Information Consolidation Units [12].

In addition, the following book is of direct relevance and

could be used as one of the course texts:

*Valls, J. Information Services for Developing Countries [13].

The following article from the journal Information Processing and Management can be used as a general introductory reading for both teachers and students:

*Saracevic, T. Processes and Problems in Information Consolidation [14].

The course as designed here follows directly from the work of the author as reported in [6] and [14] and much of the narrative describing important points for each topic is taken from these two sources.

A general treatment of information work, including sections on international information systems, indexing, abstracting, and management of information centers can be found in another book published by Unesco:

*Guinchat, C. and Menou, M. General Introduction to the Techniques of Information and Documentation Work [15].

The bibliographies in [6] and [15] are extensive and could be of considerable use in the course.

Organization of the Handbook

In addition to the Preface the Handbook contains an introduction, three parts, a reading list and one appendix.

The Introduction provides a general description of the role of information in development and the associated information problems which serve as a framework for information consolidation activities.

Part I has three chapters that deal with the design aspects of the course: rationale, purpose and objectives, and structure of the course.

Part II has thirteen chapters that deal with the contents of the course. Each chapter in Part II corresponds to a topic treated in the course. Part II is actually the syllabus for the course and it is the main part of the Handbook.

Part III has two chapters that deal with implementation, namely with organization and presentation of the course and course evaluation.

Appendix I provides a selective list of organizations engaged in information consolidation to serve as possible contacts.

INTRODUCTION

Development is purposeful social change toward a kind of social and economic system that a society decided it wanted. Development is a highly complex process by which a society is changed toward more self-sufficiency and less dependence -- development is designed to produce higher levels of living and higher per capita income and productivity, coupled with equitable distribution. Development involves introduction of new ideas and configurations particularly concerning modern production methods and health, educational and other practices contributing to a higher quality of life.

As such, development is an evolutionary, organic process where a positive interaction of many elements is needed to create a success. To create positive conditions for development a number of resources are needed: human, economic, physical, technical, and not the least informational. In other words, information, particularly scientific, technical commercial, health and related information is a vital resource needed for development, in addition to the other resources. Information has great potential value in decision making, problem solving, and in the conduct of work and life. The importance of information for development has been stressed a great number of times by international organizations, by numerous studies, and by national bodies and plans throughout the world.

Obviously, the main factor in making information a valuable contributor to development is in its use. Information that is not used is as useless as a buried, lost treasure. Minimum conditions for effective use of information include:

1. A level of information infrastructure (indigenous information systems and services) that make information available and accessible for use. Clearly, resources are needed to create and maintain such an infrastructure.

2. A propensity on the part of potential users to use information. Educational, cultural, economic, political, and social factors play a role in recognition of the value and need for information and thus in its eventual use.

Over the past decades considerable progress has been made in improvements of availability and accessibility of information in a large number of developing countries. Information infrastructures are being built, information technology is being introduced and applied, information professionals are being educated. However, information problems and needs are still great and in many instances the lack of information and the lack of resources for building and up-keep of information infrastructure are still a challenge.

However, in a great many instances even where the two minimumm conditions are met the utilization of information has by no means reached its potential. The problem is a lack of appropriate information. APPROPRIATE INFORMATION means:

> the right information at the right time in the right amounts and at the right comprehension level of a given group of users.

In other words, available and accessible information is often unused because it is simply not presented in a content and form that are appropriate for a given group (or level) of users. Consolidation of information is suggested as a solution of problems caused by a lack of appropriate information. As such, consolidated information is particularly geared toward increasing utilization of information by various user groups in developing countries.

However, providing consolidated information is a task which in itself requires considerable skills, efforts and resources. Efforts and resources are needed to establish and maintain information consolidation units, to ensure the essential cooperation between subject specialists and information specialists, and to educate and train professionals skillful in creating information consolidation products and in provision of associated services.

Information consolidation is not in competition with traditional forms of intellectual organization of information (i.e. indexing, abstracting, classifying, cataloging, coding, etc.). To the contrary, it can only be achieved using the standard secondary information services and in cooperation with such services. Therefore, education and training for information consolidation is not in competition with education and training for secondary information services. To the contrary, it can only be successful if done within the broader framework of education and training of information professionals.

Information consolidation is not a panacea to information needs and problems, but it is one of the important approaches to be considered together with a host of other information products and services. Consolidated information products and services can play an important role in satisfying a number of critical information needs. In turn, proper education and training of information professionals in the art and science of information consolidation is a key to success of any and all information consolidation efforts. To insure such education and training, educators need materials to design and conduct courses. This Handbook addresses such a need.

Chapter I-1

RATIONALE AND THE NEED FOR THE COURSE

The course is rationalized on the basis of:

1. The importance and role of information in development.
2. The barriers to fruitful use of information.
3. The place of information consolidation in the spectrum of other information activities directed toward the increase in information use.

The first point was discussed in the Introduction and the other two points are elaborated on below.

Barriers to Use of Information

Clearly, on almost any one topic today there is an overabundance of information. The so called "information explosion" presents most formidable problems to organizing information and to making it available and accessible. However, there is an equal and even at times more serious problem of actual use of existing information, particularly in science, technology, health, business and related areas. Even when such information is readily available it may not be used by potential users. A paradox is at work:

> in many instances when users could benefit from information and the actual information is available, the information is not used.

Why is that? What are the barriers to effective use of information? Among others such barriers involve the following aspects:

*There is too much information on a topic and the potential user is overloaded or overwhelmed - the sheer amount decreases the willingness to use information, taking too much time and effort.

*Information is presented in a language and/or terminology which is outside the user's experience - the language (be it a foreign tongue or 'technicalese') impedes comprehension.

*Information is presented in a context or with examples that are outside the user's cultural framework - the divergent

cultural attributes impede the ability to relate to specific circumstances.

*Information is presented in a form that is hard to follow - the packaging may be an impediment to information absorption.

*Information may not be trusted - validity and reliability of information is not evaluated and thus information is questioned.

These and similar barriers have been and still are a most serious impediment to the use of information throughout the world. They have been recognized as serious information problems and a number of solutions have been proposed and implemented. Information consolidation is one of such solutions.

Solutions to Information Barriers

Bibliographic organization, classification, indexing, abstracting and related secondary information services are a most important solution to organizing and controlling information. Without them there would be total and unthinkable chaos. A great many important activities, such as science would grind to a halt. Thus, it is clearly justifiable to have courses and training on these topics.

However, the processes and services dealing with bibliographic organization, indexing, abstracting and the like do not address directly many of the critical barriers to information use as enumerated above. For a long time it was recognized that other solutions are needed. Over the years a number of such solutions have been tried and proven successful, among them:

*Scientific and technical reviews and state-of-the-art reports.

*Handbooks synthesizing data from a number of sources.

*Compilations of critical, evaluated data.

*Business, commerce and market summaries.

*Briefings on a topic requiring a decision and discussing alternate courses of action.

*Technical writings producing information on a complex technical topic in a simplified language for wide use by non-specialists.

*Popularizations of science writings producing information on scientific advances and cause-effect findings comprehensible to nonscientists.

*Dissemination of information through demonstration and show-how.

Information services have been initiated with particular attention to one or more of these solutions, the most important being,

1. Information analysis centers using a high degree of selectivity and then evaluation and synthesis of existing information producing any of the products enumerated above.

2. Extension services oriented mostly toward agriculture and providing demonstration, information, and advice to farmers in the framework of local circumstances.

3. Public health services providing not only health care, but even more so health information and advice to broader populace.

All of these information products and services as enumerated have one main thing in common: they are directed toward fruitful use of information. To achieve this, they promote cooperation between subject specialists and information specialists. Some of their products and services have been directed toward specialists (scientists, engineers, government officials, doctors and health officials, educators, businessmen, etc.) while others were directed toward broader groups in the population (workers, farmers, technicians, parents, etc.) A concept of a well defined audience of information users was clearly present in all of them.

The concept of information consolidation has evolved from the products and services as enumerated.

Unfortunately, library and information science curricula have not incorporated to any significant degree education and training for any of the enumerated products or services in general, or for information consolidation in particular. Since there is a demonstrated need for information consolidation products and services, the education and training of information professionals ought to include courses dealing with information consolidation. Furthermore, since courses in bibliographic control, indexing and abstracting do not deal with topics in information consolidation and an attempt ought to be made to clearly enunciate such topics not as competition to courses in bibliographic control, indexing and abstracting, but as their extension.

Summary

Justification for introduction of an information consolidation course in a library and information science

curriculum or in continuing education for information professionals is derived on the basis of:

1. Potential of information as a vital resource contributing to development

2. Numerous barriers to fruitful use of information and related need to eliminate at least some of the barriers through provision of appropriate information

3. Existence of a body of knowledge competencies and practices in making information products and providing information services directed toward an increase in information use by a broad array of users.

Chapter I-2

PURPOSE, OBJECTIVES AND ORIENTATION OF THE COURSE

Obviously, a clear sense of the purpose and objectives of a course are a prerequisite for its success. It does not guarantee the success, but the absence of such a sense guarantees failure. This illustrates the importance of clearly stating the purpose and objectives of this or any other course.

The specifics of the purpose and objectives of a course on information consolidation are dependent on the specific context of the institution or organization where the course originates. Thus, enunciated here are only general statements of purpose and objectives which then can be modified to fit specific circumstances.

Purpose

The general purpose of a course in information consolidation is to provide the participants with:

1. the awareness and knowledge of information consolidation as an important approach to satisfying definite information needs particularly in relation to development and,

2. competencies in the application of specific methods for information evaluation, analysis, synthesis, and repackaging that are geared toward enhancement of information use by definite user groups.

Thus, the course actually has two aims: first, creation of an awareness and knowledge of information consolidation as a whole, and second, attainment of specific competencies to participate in creation of information consolidation products and/or provision of associated services.

Objectives

Following from the course purpose, the more specific objectives of the course on information consolidation are:

1. To define the nature and environment of information consolidation and describe its role and potential benefits in satisfying information needs of definite groups of users.

2. To survey characteristics of users, methods for user studies, and procedures for marketing and dissemination

of information consolidation products and services to users.

3. To provide a description of and training in various methods for producing information consolidation products geared toward three different groups of users: (i) professionals and policy makers; (ii) technicians, workers, and communicators/intermediaries and (iii) community groups and mass/popular use. This includes cooperation between subject specialists and information specialists.

4. To provide an overview of elements involved in establishment, and management of information consolidation units and a perspective for information consolidation in different environments.

Emphasis and Orientation

While the course is designed to treat these four objectives as an integrated and interacting whole, the emphasis (in terms of amount of time spent in the course) is on objective 3, which deals with methods for information consolidation. The course combines a strong treatment of professional practice with a survey of all other major aspects involved in information consolidation. In other words, in part this is a survey course and in part a practical training course, with an emphasis on the latter.

The reasons for involving both aspects in the course, i.e. a survey of all major elements in information consolidation and specific practical training are as follows:

1. It is unlikely that information consolidation is discussed in any other course in the existing academic or continuing education programs, thus, a survey is needed to provide for an understanding of the whole approach. Without such an understanding the methods by themselves may become an exercise in isolation of their rationale and applications.

2. It is also unlikely that the specific methods of information consolidation are treated in any other course in the program, thus stress on practical methods and exercises is needed to create a beginning of professional competencies. Such competencies will serve the student alongside of those gained in cataloging, classification, indexing, abstracting and/or other related processes.

STRUCTURE OF THE COURSE

Approach

The classic systems approach or systems analysis consists of identifying and clarifying the following aspects related to a system under study: environment(s), purpose, inputs, processing, outputs, and management/evaluation. While these aspects may be described or analyzed separately, in the system approach they are treated as a closely interacting set of components, affecting each other. Information consolidation is in effect a system and appropriately the system approach was used in structuring of the course.

Accordingly, the course deals in sequence with the environmental aspects of information consolidation, its purpose and justification, the users and uses, values and benefits, inputs to information consolidation units, various types of processing, possible outputs and dissemination, and the management of information consolidation units.

Areas and Topics

The course is subdivided into the following seven general areas:

A. DEFINITION AND ENVIRONMENT
B. USERS AND BENEFITS
C. INPUTS
D. PROCESSING METHODS AND TECHNIQUES
E. OUTPUTS
F. MANAGEMENT
G. PERSPECTIVE

In turn, each of the areas is presented by one or more topics which involve distinct lectures, readings, assignments, and/or demonstrations. There are thirteen topics in all, distributed across the seven areas. Because of the variations in the subject treated, naturally, topics are not of equal length. According to objectives as specified in Chapter I-2 the heaviest emphasis is put on topics that deal with practical aspects - thus, Areas D and E (Processing Methods and Outputs) are treated at greatest length and depth.

The outline of the course, including areas and topics is presented in Table 1.

Part II of this Handbook describes each topic in some depth including:

1. The instructional objectives and rationale for the topic.

2. Detailed outline for the topic.

3. Narrative of the most important points covered in the topic.

4. Teaching suggestions including possible readings, examples, assignments, and distribution in lectures.

The suggested readings are by necessity general in nature - most of them involve Unesco/PGI published documents. Obviously, each instructor will wish to include up-to-date readings, examples, and assignments that pertain to particular environments and circumstances.

Table 1: Outline of the course Information Consolidation

Area A. DEFINITION AND ENVIRONMENT

Topic 1. Definition and Social Role of Information Consolidation

2. Purpose and Framework of Information Consolidation

Area B. USERS AND BENEFITS

3. Value and Benefits of Information Consolidation

4. Users and User Studies

Area C. INPUTS

5. Selection and Evaluation of Information

Area D. PROCESSING METHODS AND TECHNIQUES

6. Overview of methods and products for information consolidation

7. Reviews and related products

8. Technical writing and Popularization for Mass Use

Area E. OUTPUTS

9. Packaging Media and Formats

10. Dissemination of Information Consolidation Products

Area F. MANAGEMENT

11. Marketing of Information

12. Management of an Information Consolidation Unit

Area G. PERSPECTIVE

13. Summary and Perspective for Information Consolidation in Given Environments

PART II CONTENTS

AREA A: DEFINITION AND ENVIRONMENT

Chapter II-1

FIRST TOPIC: DEFINITION AND SOCIAL ROLE OF INFORMATION CONSOLIDATION

Instructional Objectives and Rationale

The objectives of this first topic are to:

1. Start a course with a clear definition of information consolidation.

2. Examine the broader social role for information consolidation, particularly in relation to development and the state, aspirations, and needs of society and various social institutions.

3. Enumerate the barriers to use of information in order to place information consolidation within the framework of a solution to some of the barriers and provide its justification.

The course starts with basic definitions because most likely the participants have little or no knowledge about information consolidation. In this way, all will start with the same conceptions. Through the outline of processes in information consolidation the outline and sequence of the course is established as well.

Linked with definitions is a discussion of the role of information consolidation in the broader framework of society, social needs, and development.

This establishes the framework for justifying information consolidation in general and for later specific discussions on the purpose and value of information consolidation in topics 2 and 3 respectively. The participants should get an idea as to where information consolidation fits in the frame of society at large.

Outline of Topic 1

1.1 Evolution of the concept of information consolidation
Historical evolutions of the concept through various international meetings, particularly of UNESCO and other agencies. Problems addressed and recommendations made.

1.2 Definitions of information consolidation
Definitions as adapted by the Sri Lanka meeting [2] and as offered in Consolidation of Information Handbook [6]. Definition of an information consolidation unit. Essential features. Outline and sequence of the course on basis of this overview.

1.3 Social and economic development
Goals of development. Resources needed for development: human, economic, technical, and informational. Information as a vital resource in development. Use and potential of information. Examples from specific environment. Recommendations from U.N. agencies.

1.4 Barriers to information use
Historical development of information consolidation as a response to barriers to information use. Barriers in respect to: information explosion, language and terminology, context to presentation, form and needs, validity and reliability.

Narrative of Important Points in Topic 1

1.1 Evolution of the concept of information consolidation

The origin of the concept of information consolidation is discussed in the Preface thus it is not repeated here. The thrust of discussion from listed reports can be summarized as follows.

Of course, an overabundance of literature, or even of information on any one topic today presents a most formidable modern information problem. However, for many information users and potential users, for many decision makers at all levels the problem is quite different: there is a lack of appropriate information, namely of information which they can comprehend, assimilate, and use with some confidence on their own level and within the framework of their own circumstances. Much of the existing literature in science, technology, health, business, education and related fields is written by peers for peers, which effectively shuts out non-peers. A paradox is at work: while on the one hand there is an overabundance of literature on any given topic, on the other hand an overwhelming majority of potential users who may benefit from the information in that literature cannot use it, at least not directly or without doubts.

To underscore: the real problem related to the use of information is not its overabundance, but the fact that information is not being packaged in a form useful to decision makers (at whatever level) providing a synthesis, evaluation and/or summary of alternate choices.

The general issue treated in this course is the problem of ensuring fruitful use of existing information. In turn, the use and impact of information are the central problems (or they ought

to be) for all information professionals, as well as for the whole information infrastructure. While the concept of information consolidation (as defined below) was developed primarily as one of the means for alleviating information problems in developing countries, and for helping in technology transfer, the suggested processes, products, and benefits are universally applicable, no matter what the stage of development.

1.2 Definition of information consolidation

Definitions and essential features presented in the Preface are again repeated here. This definition was adopted at the Unesco/PGI meeting in Sri Lanka [2]:

> "INFORMATION CONSOLIDATION ACTIVITIES is used to define the responsibilities exercised by individuals, departments, or organizations for evaluating and compressing relevant documents in order to provide definite user groups with reliable and concise new bodies of knowledge. Individuals or groups of individuals performing information consolidation activities would each constitute an INFORMATION CONSOLIDATION UNIT (UCI)."

A related, but more elaborate definition was offered in [6]:

> "CONSOLIDATED INFORMATION is public knowledge specifically selected, analyzed, evaluated, and possibly restructured and repackaged for the purpose of serving some of the immediate decisions, problems, and information needs of a defined clientele or social group, who otherwise may not be able to effectively and efficiently access and use this knowledge as available in the great amounts of documents or in its original form. The criteria for selection, evaluation, restructuring, and repackaging of this knowledge are derived from the potential clientele."

Essential features of information consolidation are:

1. user orientation, and
2. cooperation between subject specialists and information specialists.

1.3 Social and Economic development

Since the whole Introduction is devoted essentially to this topic, the discussion is not repeated here.

However, an additional point to be stressed is the involvement and recommendations of the United Nations and its various organizations. The Unesco efforts in promoting information consolidation were numerous as reflected in the reports enumerated in the Preface and used throughout many topics in this course.

The U.N. Conference on Science and Technology for Development had two recommendations that are relevant for efforts in information consolidation [4]:

> "32. Developing countries should strengthen and co-ordinate their agricultural and industrial extension services in order to achieve a more effective and more efficient transfer of information to the end users, particularly in the rural areas, and to allow feed-back to the research and development institutions concerned.
>
> 33. Special attention should also be paid to the establishment of comprehensive mechanisms, to utilize mass media for bringing about a scientific temper and awareness of scientific knowledge as well as the promotion of creativity and innovation among the population."

Thus, information consolidation can be seen as a most effective way to transfer appropriate technology to developing countries and a way to utilize many types of dissemination channels and media to increase the use of information. That is the primary role of information consolidation in social and economic development.

1.4 Barriers to information use

Since Chapter 1 contains a whole section Barriers to Use of Information, the discussion is not repeated here. The enumeration of barriers in that section is particularly relevant.

Teaching Suggestions

The reports [1], [2] and [3] provide an ideal introductory reading for both teachers and students.

The nature of development and the role of information consolidation in development is discussed in Handbook [6] Chapter 3 pp. 32-51.

At this time it is appropriate to introduce development activities and/or plans for the given environment where the course is offered (e.g. country, region, sector, institution) and discuss the role of information and the information infrastructure within those activities and/or plans.

A possible assignment is to ask the students to discuss their own perception of information problems related to information use, gained from their previous courses and/or professional experience.

Topic 1 could be subdivided into two lectures, first covering the evolution and definition of information consolidation (Topics

1.1 and 1.2) and the second discussion of development and the role of information in development and the barriers to information use (Topics 1.3 and 1.4). At the end of these two lectures the students will get some general idea of the subject matter. At that time it may be appropriate to discuss the course as a whole:

1. Its purpose and objectives
2. Structure and outline
3. Assignments, requirements, schedule

The students will then be able to relate the course as a whole to the general problems of fruitful information use addressed by information consolidation.

Chapter II-2

SECOND TOPIC: PURPOSE AND FRAMEWORK OF INFORMATION CONSOLIDATION

Instructional Objectives and Rationale

The objectives of the second topic are to:

1. Enumerate a variety of solutions to barriers to information use and specify the relation between information consolidation and other information services, particularly indexing and abstracting.

2. Specify the objectives and audiences for information consolidation.

3. Provide an overview of the processes involved in information consolidation.

Topic 2 is a direct continuation of Topic 1, however, while Topic 1 is rather general, Topic 2 becomes specific. In Topic 1 a definition and role of information consolidation is provided, ending with enumeration of barriers to information use, and in Topic 2 the solutions to these barriers are discussed and information consolidation is placed within the framework of these solutions. Especially important here is drawing relations between information consolidation and other information services (particularly indexing and abstracting) and showing that they are not in competition, but they supplement each other.

The summary of information consolidation processes is another way of defining information consolidation, as well as an overview of Topics 5 to 10. The participants should get an idea of what is involved in information consolidation processes.

Outline of Topic 2

2.1 Solutions to barriers to information use
Bibliographic organization, indexing, abstracting, and their relation to information consolidation. Reviews, handbooks, state-of-the-art reports, briefings, technical writing - as a solution to problems of synthesis, evaluation and repackaging of information.

2.2 Objectives and audiences for information consolidation
Objectives in terms of information transfer, information use, and potential users. Distinct types of user groups addressed by various information consolidation products and services. Information consolidation and extension services and communicators.

2.3 Summary of information consolidation processes

The processes of information consolidation as recognized explicitly or implicitly by definitions. Brief definition of each process: user study; information selection and evaluation; analysis and synthesis; restructuring; packaging and repackaging; dissemination; marketing. Cooperative nature of many processes; involvement of subject specialists.

Narrative of Important Points in Topic 2

2.1 Solutions to barriers to information use

Since Chapter 1 contains a whole section Solutions to Information Barriers the discussion is not repeated here. The enumeration of products and services which are used in various ways to enhance information use is especially relevant as is the discussion of the role of bibliographic organization, indexing and abstracting and its relations to information consolidation. It should be stressed that information consolidation is not in competition with indexing and abstracting but that it is a supplement and that it has differing objectives.

2.2 Objectives and audiences for information consolidation

The basic objectives of information consolidation can be summarized as follows:

1. To increase the effectiveness of information transfer to and within developing countries.
2. To encourage more intensive information use in a wide array of developmental activities, and
3. To widen the circle of the population of potential users particularly by fulfilling specific information needs for evaluated and synthesized information.

Several distinct types of user groups are addressed by various information consolidation products and services:

*Scientists, engineers and professionals engaged in R&D activities, manufacturing, health services, planning, education, etc.

*Managers and business people engaged in small and large businesses, commerce, marketing, etc.

*Policy and decision makers in government.

*Technicians, supervisors, paraprofessionals.

*Communicators such as extension workers and services, teachers, local leaders in adapting new technology or practices.

*Agricultural and industrial workers from rural and urban populations.

Three types of technical sophistication can be readily distinguished among these audiences:

1. High degree of sophistication about a subject linked with a relatively high general education level.

2. Some degree of sophistication about a subject linked with relatively higher general education and/or technical training.

3. Little sophistication about a subject linked with little or no general education and/or technical training, even to the extreme of semi-literacy or illiteracy.

The information needs of these last two groups are receiving particular attention from information consolidation efforts, because these are the groups that are left unserved by the majority of existing information services and products produced in both developed and developing countries. Thus, there is a great need for synthesized, condensed, evaluated and repackaged information along with appropriate information products and services that are addressed primarily toward know-how, know-where, and know-who.

A special audience for information consolidation are services that are themselves devoted to information transfer, such as agricultural extension services, public health units, literacy campaigns, and the like. These services as well as persons acting as communicators (teachers, extension agents, demonstrators of equipment or processes) can be greatly strengthened by information consolidation products and services. Their own array of information and services can be updated more thoroughly and much faster. Thus, information consolidation can play a role for intermediary users (such as the mentioned extension services and communicators) as well as for end-users.

The effectiveness of information consolidation be it for intermediaries or end-users depends, of course, on a large number of factors; the principal one being whether the products are tailored to the user's economic, social and cultural situation and other user variables as discussed in Topic 4.

2.3 Summary of Processes in Information Consolidation

Implied in the definitions presented above are these basic processes involved in information consolidation:

1. Study of potential users to derive criteria for all the other processes.

2. Selection of information source(s) potentially containing the most useful information for given user problems and information needs; the selection can be done from a variety of primary and secondary sources.

3. Evaluation of information as to its intrinsic merit, validity, and reliability.

4. Analysis to identify and extract the most salient features.

5. Restructuring (if necessary) the extracted information into a content that can be used most effectively and efficiently by users; this may involve synthesis, condensation, rewriting, simplifying, review, state-of-the-art presentation, etc.

6. Packaging and/or repackaging of restructured information in a form that will enhance the potential of its use. (Restructuring deals with the contents or substance of information while packaging deals with the media, format and the form of its presentation.)

7. Diffusion or dissemination of information in ways that will encourage and promote its use; this may also involve education of users in the use of information and marketing of information.

8. Feedback from users, evaluation of the efforts, and adjustments.

Figure 1 summarizes the processes, elements, and relations involved. Although related to a number of other information activities, most notably abstracting and indexing, information consolidation is a proposition of much higher complexity and greater demands. In this lies a basic problem of information consolidation:

> In comparison to many, (if not most) information activities, it involves higher complexity of processes and organizations and greater demands in human technical, and economic resources. Being selective and evaluative, information consolidation also involves a different philosophy and approach. Essential to the success of information consolidation is a close cooperation between subject and information specialists.

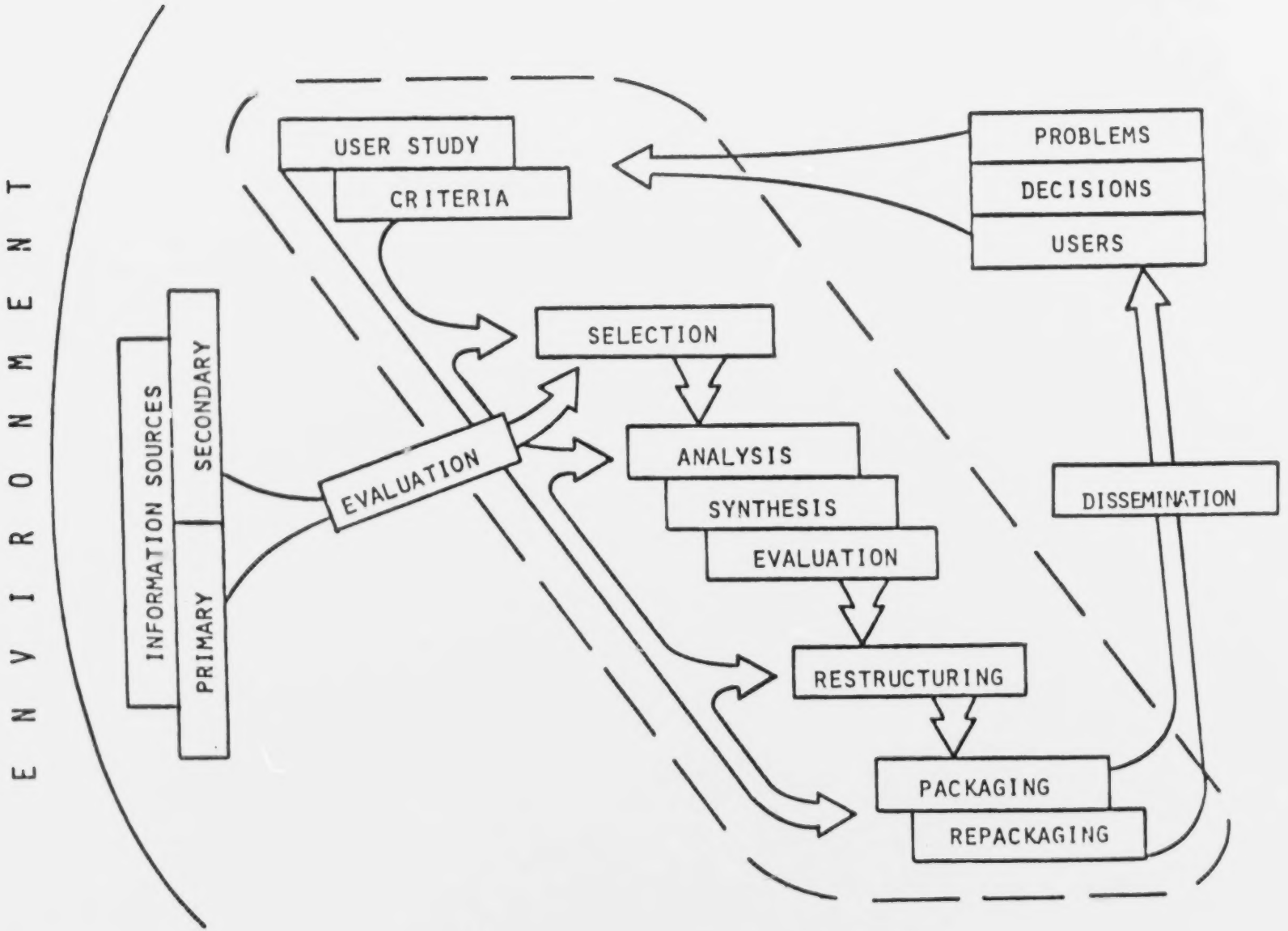


FIGURE 1 PROCESSES IN INFORMATION CONSOLIDATION

Teaching Suggestions

The conceptual framework and summary of processes in information consolidation are covered in Handbook [6] Chapter 2, pp. 9-31. Contemporary information problems and solutions, particularly as they relate to development are discussed with many examples in Valls [13], particularly in: PartI: "Information Today" - Chapter 1: "The Information Explosion and Its Consequences," and Chapter 2: "Improving Information Facilities in Developing Countries."

At this time it is appropriate for the instructor to introduce pamphlets and/or products from information analysis centers or information consolidation units in the region. Also as examples may serve the reports issued by Unesco in conjunction with Tata Energy Research Institute in India [7,8,9] as well as their manuals for extension workers and decision makers [10,11].

A possible assignment is for participants to examine and write a descriptive report on several classes of products in information consolidation, such as reviews, state-of-the-art reports, simplified instructions (technical writing), pamphlets on health or agricultural practices, etc.

As mentioned, this topic is proceeding from general descriptions to specific products and enumeration of processes. It would be useful to assemble an array of various information consolidation products and use them as examples during lectures, as well as have them available for student examination and assignment.

The topic can be divided into two lectures, the first covering the solutions to barriers to information use and demonstration of products (Topic 2.1) and the second the objectives and audiences for information consolidation and the summary of associated processes. (Topics 2.2 and 2.3)

Chapter II-3

THIRD TOPIC: VALUE AND BENEFITS OF INFORMATION CONSOLIDATION

Instructional Objectives and Rationale

The objectives of the third topic are to:

1. Provide arguments for justification of information consolidation activities as complex processes.
2. Show the value of consolidated information for decision making in respect to various information products.
3. Enumerate possible benefits of information consolidation in relation to a variety of user activities.

The thrust of this topic is to provide arguments for justification of information consolidation. The need for justification is crucial because information consolidation consists of complex and costly activities. Furthermore, understanding values and benefits is crucial to acceptance by users and for marketing as discussed in Topic 11. The whole concept of marketing is treated as a voluntary exchange of benefits.

Outline of Topic 3

3.1 Justifying information consolidation
General justification in terms of: contribution to social and economic development; economic aspects; quality of life.

3.2 Value in decision making
Increase in complexity of decision and information requirements. Changes in value of information products for decision makers and relation between degree of consolidation and value.

3.3 User benefits
List of the benefits for users derived from using information consolidation products. Specifying benefits to users and aiming products toward benefits.

Narrative of Important Points in Topic 3

3.1 Justifying Information Consolidation

Information consolidation is a process of higher complexity than indexing or abstracting. However, offsetting the problem of higher complexity and need for greater resources is the higher value of consolidated information. But what values and benefits should be stressed? This question is not considered often even though the answers are crucial for justification of information consolidation to funders, and for communication and promotion to users.

On a general level information consolidation is justified for its contribution to the processes of social and economic development. On a specific level its benefits can be argued as a contribution to problem solving and decision making. Let's discuss each in turn.

The process of development in an increasingly interdependent world involves and requires an increase in sophistication and use of scientific, technical, commercial and related information. The value of such information does not lie in its existence (or even in the systems that assure its availability and accessibility), but in its acceptance and use. In turn, chances for acceptance and use of information are increased by its being more appropriate. Consolidated information aims at being more appropriate to the users, their needs, and levels, the capacities and time allotments given to information absorption and similar user-related factors. Clearly, arguments for consolidated information should involve economic aspects (savings, earnings, productivity, competitiveness, etc.), but its value may be even greater because it is related to other values in a society. Consolidated information may contribute to information sophistication of a population, which in turn contributes to quality of life. For instance, consider the value of consolidated information that helps to improve sanitation, which in turn decreases disease, pain and suffering.

3.2 Value in decision making

More specifically, the value of consolidated information can be argued in relation to its role in decision making and problem solving. Making decisions and solving problems, even those encountered in everyday work, requires information. Moreover:

*As complexity of decisions or problems increases, the need for information intensifies;

*As the amount of available information proliferates, it becomes harder to get and use relevant information;

*As complexity, interdisciplinarity, and technical sophistication of available information increases, less can be used by decision makers and problem solvers as presented in its original form.

All this points to the need for consolidated information. But the value of consolidated information changes with the type and amount of information. To illustrate: a pile of documents on a given topic on a decision maker's desk or in a worker's hand, has little value to the decisions they have to make on that topic or problems they have to solve, even though the documents may have all the information that is needed. Summaries may have a bit more value. Mergers of excerpts from a number of documents may have still more value. Evaluated information further increases the value while studies addressing the topic (reviews, state-of-the-art, market studies, statistical summaries and correlations, etc.) increase this value considerably. The highest value of information is in a set of alternative choices summarized from all the other sources mentioned and recommendations for decisions or resolution of the problems. These relations are expressed in Figure 2. In other words,

*as the amount of information presented to a decision maker is increasingly consolidated, its value increases;

*as the information is increasingly expressed in the everyday language and the social/cultural framework of the user, its value increases for that user;

*as the information is increasingly packaged in a way that will make its use easier, its value increases.

Another way to look at the value of information consolidation is in relation to loss of information or the information that never reaches a user or group of users even though such information is readily available in the public knowledge and through various primary and secondary literature sources. As can be seen from Figure 3 not all primary or secondary sources may reach the users or be appropriate for users and their problems and associated decisions they have to make. The role of information consolidation is to be as appropriate to the users as possible.

3.3 User benefits

The values of consolidated information is clear to information workers. Unfortunately, the values and benefits are far from clear to many users or potential users. Even the users with a high level of education and responsibility fail to see the benefits of consolidated information for them and for the aims of their organizations. This is another problem:

Often the values and benefits of consolidated information

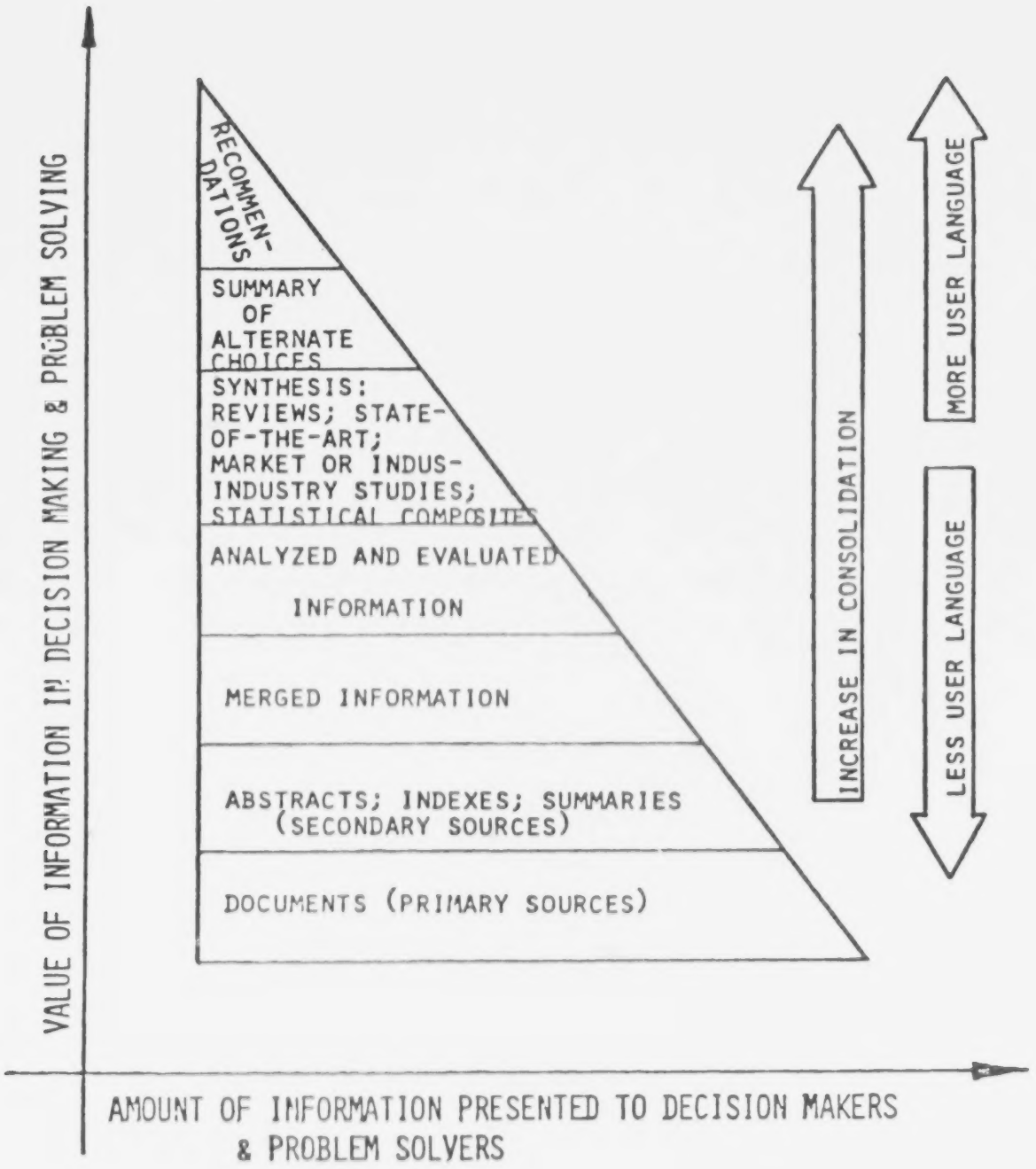
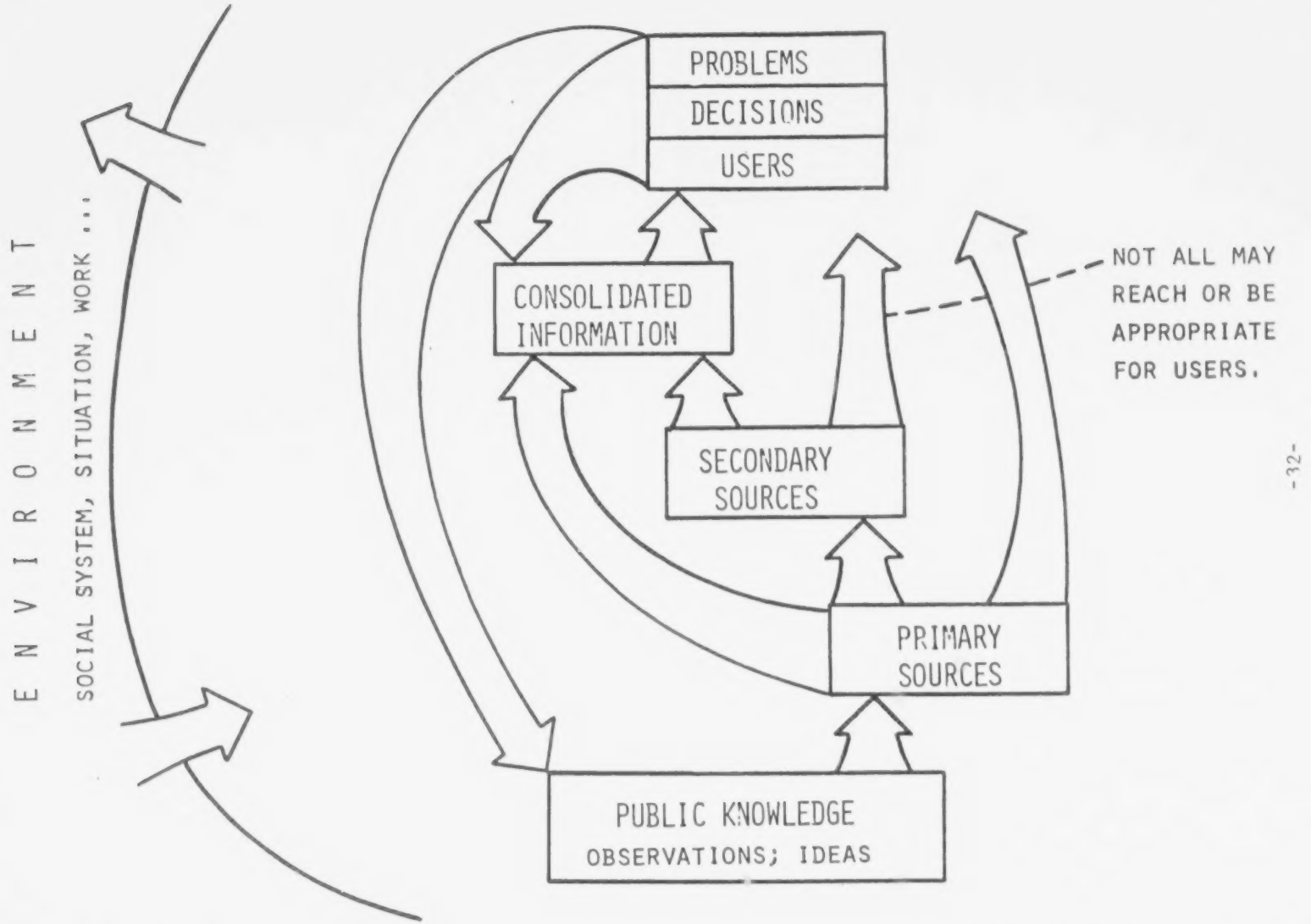

VALUE OF INFORMATION IN DECISION MAKING & PROBLEM SOLVING
RECOMMEN-DATIONS
SUMMARY OF ALTERNATE CHOICES
SYNTHESIS: REVIEWS; STATE-OF-THE-ART; MARKET OR INDUS-INDUSTRY STUDIES; STATISTICAL COMPOSITES
ANALYZED AND EVALUATED INFORMATION
MERGED INFORMATION
ABSTRACTS; INDEXES; SUMMARIES (SECONDARY SOURCES)
DOCUMENTS (PRIMARY SOURCES)
INCREASE IN CONSOLIDATION
MORE USER LANGUAGE
LESS USER LANGUAGE
AMOUNT OF INFORMATION PRESENTED TO DECISION MAKERS & PROBLEM SOLVERS

FIGURE 2 VALUE OF INFORMATION IN DECISION MAKING AND PROBLEM SOLVING



-32-

FIGURE 3 RELATION BETWEEN PUBLIC KNOWLEDGE, CONSOLIDATED INFORMATION AND USERS

are not clear to the target clientele i.e. to the users and potential users.

The users may not even think about benefits involved. Neither do the information workers try often to enumerate the values and benefits, nor do they try to communicate them to users. In many cases, user education efforts in producing such information. Otherwise, even good products and services may lie fallow and unused. Therefore, it may be of interest to provide a list of benefits which could be derived from usage of consolidated information as presented in Table 2. These benefits, when adopted to specific types of consolidated information and specific clientele may be used by information consolidation units in promotion of their products/services and in communication with and education of their clientele. Furthermore, the products/services should be deliberately aimed toward potential achievement of these benefits.

Teaching Suggestions

The values and benefits of information consolidation are covered in the Handbook [6] Chapter 3, Section 3.6, pp. 47-51. The benefits are further discussed in the article [14], from where Table 2 is taken.

At this time it is appropriate to discuss the value of pamphlets assembled for demonstration in the previous topic and encourage the participants to come up with benefits of various products on their own.

A possible assignment is for participants to select any information consolidation product and describe its potential value and benefits to intended users. Another assignment is to prepare an argument for justification of an information consolidation unit based on values and benefits of its services and products.

Topic 3 treats a subject rarely discussed in relation to many, if not most information products. Therefore, the concept of value and benefits of information in general may have to be discussed first. In practical terms an array of products as suggested by Figure 2 could be assembled and their value and benefits discussed.

The topic can be divided into two lectures: the first covering justification of information consolidation and the value of information in decision making, (topics 3.1 and 3.2), and the second covering benefits to users, (topic 3.3) together with extensive discussion by participants. the discussion of benefits is an excellent vehicle to involve the whole class and stir up imagination. It is also a vehicle to orient thinking toward users.

TABLE 2: Potential benefits that may be derived from use of consolidated information.

GENERAL ACTIVITY OR AREA	POTENTIAL BENEFITS
Decisions	Better informed about alternatives and consequences. Improved decisions making process. Reduction of uncertainty.
Knowledge, competence	Increase in level, depth, breadth by individuals or groups. Higher sophistication in drawing relations between seemingly unconnected facts.
Adaptation	More appropriate and adjusted responses by individuals, groups or organizations to demands of and changes in the environment and a complex world.
Productivity	Higher levels and outputs in work and other activities. More contacts. Increased capacity and effectiveness.
Resources	More efficient or economic use of resources. Increased capacity and/or effectiveness. Better economy.
Success	Contribution toward attaining aims of individuals, groups, organizations. Better or wider spread and acceptance of results. Detection of necessary adjustments.
SPECIFIC AREAS	INFORMATION CONSOLIDATION AIMED TOWARDS BENEFITS SUCH AS:
Enterprises. Business. Commerce.	Broadening markets. Providing appropriate responses to market conditions and demands. Meeting competition. Complying with standards and regulations. Motivating personnel. Making business decisions.
Industry. Manufacture.	Incorporating technical innovation. Adding new products. Making products appropriate. Increasing productivity. Reducing break downs.

Science	Keeping up with research front. Judging own position and advances. Making appropriate decisions on policy and allocations. Searching for related works and/or ideas for further work or methodology.
Education	Keeping up with advances in given fields and in education research, methods, approaches. Providing for educational planning and assessments or comparisons.
Individuals	Providing for self fulfillment and advancement in their given area of work or interest. Providing for wider opportunities in employment, self help, and adjustments to changing environments and conditions. Increasing sophistication toward higher quality of life.

FOURTH TOPIC: USERS AND USER STUDIES

Instructional Objectives and Rationale

The objective of the fourth topic are to:

1. impress upon the participants the need for careful and continuous study of and contact with the users,

2. describe the planning of and some possible methodologies for user studies,

3. enumerate general variables and characteristics of users and use subject to study.

The paramount importance of users is recognized in this topic. The participants should be left with a strong impression of the necessity to study users. In addition, the topic is very practically oriented, by addressing the competencies necessary for a user study. The methodological issues are treated in some depth. The participants should be able to attempt a basic user study and/or participate actively in conduct of more sophisticated studies. The narrative of this topic includes considerable details related to conduct of user studies.

Outline of Topic 4

4.1 Need for user studies and relation to all other processes
Imperative to know the information needs and behavior of users. Various ways of attaining such knowledge. Relation of user studies to design of information consolidation products and services. Relation of user feedback to operational evaluation.

4.2 Planning a user study
Necessity for careful planning of a user study. The essential steps in the plan: survey of previous studies; choosing objectives; determining variables; selecting a sample, and data collection method; determining data analysis and utilization of results.

4.3 Characteristics of users and uses studied
Types of variables studied: individual characteristics; stages or phases in information diffusion; environmental or social characteristics; communication characteristics. Connection with design, provision, and evaluation of information consolidation products and services.

4.4 Methodologies for user studies
Determination of a sample and sampling procedures. Methods for

collection of data: surveying, observation, record analysis, experimentation. Techniques for data analysis.

Narrative of Important Points in Topic 4

4.1 Need for user studies and relation to all other processes

The key to the aims, direction and contents of any and all information consolidation activity are the users. The definition quoted at the outset mentions prominently "definite user groups" (emphasis added) to which information is to be provided. Information consolidation involves a number of complex, costly, and demanding processes, as enumerated. However, the basic questions and problems are not how effective or efficient these processes are per se, but:

1. What can an information consolidation unit do to assist an information user in identifying, clarifying, or solving a problem?

2. What can such a unit do to raise the probability that a user will find useful information with minimum effort?

These two questions form a foundation on which to build information consolidation units. The questions provide a philosophical as well as a practical, operational framework for viewing the objectives and products/services and for evaluating successes and failures. These questions in effect define the framework for information consolidation.

If this framework is accepted, then it follows that the first requirement for information consolidation is: Study thy users. The users should be studied not only before an information consolidation unit is started but also during the life cycle of the unit. Study of users increases the probability of a longer life cycle, lack of such a study decreases it sharply.

User study is a difficult proposition; as yet, related theories, models, and methodologies are not fully satisfactory. However, there is a much higher probability that products and services based on user studies will be better than those based on intuition, anecdotal evidence, or committee deliberations.

4.2 Planning a user study

It is important to plan a user study carefully from the beginning to the very end and to lay out a detailed plan of each step ahead of any surveying, observing, and data collection. Plunging ahead without considerable planning is a sure prescription for a disaster, i.e. a useless or even misleading study.

The plan should consis to at least these steps:

1. Surveying the previous studies and literature in general and learning about all aspects of user studies.

2. Determining the objectives of the study.

3. Determining the variables to be studied and the model to be followed.

4. Selecting the sample of the population to be studied.

5. Determining the method for collection of data for observation.

6. Determining the method of analysis of data or observations.

7. Determining the ways of presentation and utilization of results, including dissemination.

4.3 Characteristics of users and uses studied

The basic point of a user study is to gather information that is useful in design, provision, and/or evaluation of specific information consolidation products or services geared to specific users. To underscore: user studies are a necessity in all phases of information consolidation activities, from design, to evaluation, to marketing, to management. Thus the central question is: what useful information about users or uses should be collected? In other words, what user and use variables should be studied? The choice of such variables for study is wide. Depending on the objective, individual studies will concentrate on a limited number of specific variables. Provided here is a list of general variables possible to examine in user studies, based on a model of what affects human information processing and the diffusion (transfer, use) of information among individuals:

1. Individual characteristics: the factors or variables in the receivers or users of information that effect (i) their perception of the problem faced and their definition of needed information and (ii) the specific ways they are most likely to use information and their capacity to use a given type of information.

2. Stages in the information diffusion or transfer process: relates to the amount of knowledge an individual (or group) has about a specific idea or innovation. Information needs at various stages are different and

thus information products and services have to be adjusted for each stage.

3. Environmental or social characteristics: the factors or variables in the social system, (the norms, situation, reference groups, etc.) that have an important effect on (i) individual behavior and (ii) communication in general.

4. Communication characteristics: the elements related to use and diffusion of information, particularly including: (i) information sources, (ii) information structures, (iii) information forms, (iv) communication channels, and (v) information systems. These are correlated with other variables.

Here are some of the individual characteristics that have been studied in various user studies:

* Demographic data: age, sex, national origin, etc.

* Social status data: income and other economic aspects; status in a group; values; cultural traits; opinion leadership and gate-keeping position; cosmopolitanism (orientation outside or inside social group); etc.

* Psychological data: behavioral traits and patterns; personality; intelligence; mental ability and conceptual skills; decision making patterns; security-anxiety, etc.

* Educational data: level and subject of education; knowledge or skills in given topics; language and terminology proficiency in given subjects; literacy; numeracy; etc.

* General work data: place, type and subject of work; position; responsibilities and authorities; work times, habits, requirements; etc.

In the diffusion or transfer of information the following stages can be described:

1. Awareness (or first exposure): a person (or group) is only becoming aware of the existence of information on a given subject. (This suggests provision of very basic information.)

2. Interest/knowledge: a person (or group) has shown interest in furthering his/her knowledge on the subject; active participation in gathering of information. (Suggests provision of more detailed information.)

3. Attitude formation: a person evaluates mentally provided information, develops attitudes, feelings.

(Suggests provision of critical evaluations.)

4. Trial/decision: a person is putting the information to test and work, i.e. a person is beginning to act upon gathered information. (Suggests provision of specific operational information, demonstrations.)

5. Adoption/confirmation: based on experience a person is making or reinforcing decisions about use and value of information and further implementations. (Suggests provision of evaluative data and information on various choices.)

Social or environmental factors characterize the society and environment of the group as a whole rather than the individual. However, these factors have been found to have a great effect on how individuals act upon information. Here are some of the classes of factors for which data was collected in user studies:

* Unit characteristics: data on places of work or habitat (farm, agency, industry, school); organizational patterns, authority-responsibility channels; products, services; requirements; etc.

* Social and cultural norms: cultural traits; social values; priorities; traditional-modern dimension; attitudes toward innovation; cross-cultural interactions and problems; etc.

* Political aspects: political base and subdivision; development plans, attitudes, priorities; legal aspects; desired directions, etc.

* Economic aspects: constraints; incentives; incomes; productivity; projections; micro and macroeconomics of areas of interest; etc.

* Population data: demographic, educational, occupational, and other characteristics of the population; population trends.

* International aspects: comparative data about any of the above from other countries and regions or global interactions.

As mentioned, design, provision and evaluation of information consolidation products and services should be closely connected with findings from user studies. This connection is exemplified throughout the course and in particular in the following topics:

(i) topic 5.4 dealing among others with criteria used by users in evaluation of information sources and services;

(ii) topic 6.2 dealing with targeting of information products

to different stages in information diffusion or transfer;

(iii) topic 9.3 containing Table 3 which provides a list of information consolidation products appropriate for different diffusion stages and different types of users; and

(iv) topic 11 on marketing, where market research in particular is closely related to user studies and user evaluation of existing or proposed products and services.

Thus the necessity for a close connection between user studies and all other activities involved in information consolidation is translated into the course by repeatedly referring in various topics to user variables as described here.

4.4 Methodologies for user studies

After it has been decided why to study users (objectives) and what to study (variables) comes logically the decision on how to do the study (methods). Thus, the selection of methods depends on previous decisions, on objectives of the study and on variables to be studied. Three aspects are involved in selection of methods:

1. Selection of a sample of user population.

2. Determination of procedures for collection of data from or about the sample.

3. Determination of procedures for analysis of collected data to derive or summarize results.

Each one of these has to be determined in great detail before one plunges into designing questionnaires or the collection of data. One of the most often committed mistakes (and a sure prescription for disaster) in user studies is to collect data without any idea of how they will be analyzed. e.g. "Here we have a number of filled out questionnaires (surveys, interviews). Now, what should we do with them?" At that point a statistician may be contacted but it is much too late.

It is advisable to consult a statistician to help in the selection of methods. However, a user study should not be completely turned over to a statistician without experience in communication and/or users to be studied, because meaningless statistics will follow.

As to the sampling, there are a number of methods available, among the most common being

1. Convenience sampling: picking the first 25,50 etc. users that come along as subject of study.

2. Random sampling: picking the users for study from a population at random.

3. Stratified sampling: subdividing the population into subgroups and then picking users for study at random from each subgroup.

4. Representative sampling: determining beforehand individuals, pairs of individuals, or small groups with some characteristics in common as subject of study.

There are also a number of methods available for collection of data and a great number of textbooks describe those. The most often used are:

1. Surveying: questioning users and obtaining answers directly from users about their behavior, attributes, values, conditions and/or preferences. This is by far the most often used method in user studies, but also the most obtrusive and thus potentially the most biased or limited of methods.

2. Observation: making direct observations on the communication behavior of users in given situations, practices, time periods, etc.

3. Records analysis: obtaining written records or other artifacts of previous communications (such as papers, correspondence, statistics) and deriving observations about users from the records.

4. Experimentation: introducing an element of communication to a carefully defined group of users and observing the results or consequences; possibly also comparing the group with another where the element was not introduced.

Next, presented are some of the data analysis methods. Many an analysis is informal, in that it consists of gaining an impression or feeling of what the data indicates and in which direction they point. For the formal analysis the most often used methods are:

1. Statistical analysis: application of standard statistical techniques to summarize, compare and test for significance data which is

expressed numerically.

2. Semantic analysis: application of semantic techniques to summarize and compare data which is expressed verbally.

3. Psycho-sociological analysis: application of pshychological, sociological, or anthropological techniques to classify or describe data which is expressed conceptually, logically, or representatively.

4. Economic analysis: application of macro or micro-economic techniques to derive conclusions in economic terms on data expressed in either or all of the above ways.

Each of these formal analysis methods do require knowledge of the respective fields, although elementary statistical and semantic analysis can be accomplished rather easily with a rudimentary knowledge of statistics and of semantic differentials. Standard statistical packages are widely available which will accomplish calculations of sums, means, medians, variances, standard deviations, percentages, chi-squares, regressions, or cross-tabulations of data. Standard semantic analysis techniques are not available, however, appropriate techniques can be adapted relatively easily from the myriad of previous user studies.

Finally, to stress again some of the more commonly found mistakes or pitfalls in user studies:

* jumping into a study (e.g. administering a questionnaire) without clearly elaborated objectives and methods of analysis,

* selection of variables (e.g. questions) which are extraneous to a study and ommission of variables which are crucial,

* poor design of study instruments (e.g. questionnaires),

* specification of inadequate, biased or wrong samples,

* sloppy data collection procedures,

* applying statistical analysis methods that are not appropriate for the type of data collected, and

* reading into results what one wants to see.

Teaching Suggestions

The models of information transfer of diffusion, variables in user studies, and methods for user studies are covered in the Handbook [6], Chapter 4, pp. 52-84. A number of enumerations from that chapter are repeated in the preceeding narrative to provide for detailed description of posssible points to be raised in lectures and exercizes on user studies.

The book by E.M. Rogers, Diffusion of Innovations [16] provides extensive materials on and examples of user studies pertaining to the transfer or diffusion of information, particularly among users in the broad populace (agriculture, workers, etc.).

A chapter by B. Dervin and M. Nilan "Information Needs and Uses" in the Annual Review for Information Science and Technology for 1986 [17] provides a literature review on the topic from 1978 to the end of 1985 and identifies the contemporary conceptual approaches to user studies. As expected, the bibliography is most comprehensive.

A book by N.J. Belkin and A. Vickery, Interaction in Information Systems [18] provides a survey of studies on the topic, incorporating studies on system-user interactions and evaluation and user satisfaction. The book also contains an extensive bibliography.

A book by C.H. Busha and S.P. Harter, Research Methods in Librarianship, Techniques and Interpretation [19] provides, among others descriptions of survey research and descriptive and inferential statistics; the book also contains extensive bibliographies on these topics.

A possible assignment is for participants to conduct a small user study within their own institution or a chosen community This can also be carried out as a class project.

This is a major topic in the course and enough time should be allocated for lectures and assignments. The topic could be covered in three lectures: First lecture to cover need for user studies and steps in planning (topics 3.1 and 3.2); second lecture to cover characteristics of users and details of information transfer process (topic 3.3); and the third lecture, methodologies for user studies (topic 3.4). It is most useful to have prepared examples from the participants' environment to illustrate specific points covered.

The assignment on user studies could be coupled with assignments for Topic 6 on determining information consolidation products and/or assignments for Topic 11 on marketing.

Chapter II-5

FIFTH TOPIC: SELECTION AND EVALUATION OF INFORMATION

Instructional Objectives and Rationale

The objectives of the fifth topic are to:

1. Stress the importance of a judicious handling of the selection and evaluation process in information consolidation.
2. Enumerate the basic elements encountered in the selection process.
3. Outline the basic constituent of selection policies.
4. Provide for a detailed discussion of selection aids.
5. Present various criteria used in evaluation of information and information services as critical to information consolidation.

The detailed treatment of this topic is justified by the very fact that selection determines the content of information consolidation products and services. No matter what else is done later, selection has to be done first. A crucial element in selection for information consolidation is evaluation - as a matter of fact, selection and evaluation go hand in hand. Thus, the criteria for evaluation are treated at some length, as well. The same criteria are later used in analysis and synthesis.

Outline of Topic 5

5.1 Elements in the selection process
Selection as a crucial process in information consolidation. Characteristics and elements involved in: (i) selectors, (ii) procedures for judging the intrinsic (objective) value of information, and (iii) procedures for judging utility and appropriateness for definite user groups.

5.2 Selection policies
Reasons for initiating well stated selection policies. Elements in selection policies.

5.3 Selection aids
Various types of selection aids: bibliographies; selected lists;

reviews; reference books and directories; content tables; indexing and abstracting sources; SDI services; new title catalogs; invisible colleges.

5.4 Criteria for selection and evaluation
Consensus as basis for judging quality of information. General criteria used in: (A) peer reviewing and refereeing in science and technology, and (B) evaluation of information sources. Adaptation to specific circumstances and objectives of an information consolidation unit.

Narrative of Important Points in Topic 5

5.1 Elements in the selection process

The processes and problems of consolidation do not start with how to consolidate but with what to consolidate. Selection which incorporates evaluation is a basic, essential and inseparable part of consolidation of information.

Selection is always present in any and all information systems and particularly in information consolidation units...be it recognized as such or not, be it done consciously or subconsciously, formally or informally, with or without articulate criteria. Unfortunately, one of the often found weaknesses in many information systems is inadequate attention paid to criteria and methods for selection, particularly in comparison to the great attention paid to later processes in connection with materials that have been selected. The essential operational cooperation between subject specialists and information specialists starts with selection.

Selection is a crucial process in that it eventually determines the content of information consolidation services and products. Selection is a judgment and it clearly involves evaluation. Specifically, selection is the application of the selection policy on the one hand and evaluation criteria on the other with the help of selection and evaluation aids. Economic and other constraints enter as well. The problems in selection and evaluation can be subdivided into these three areas:

A. Selectors: who selects?

B. Procedures for judging intrinsic (objective) value of information: how to select from the point of view of the subject or topic and given item as to the validity, reliability, authority, exhaustability, and other related criteria?

C. Procedures for judging utility and appropriateness for definite user groups: how to select and evaluate from the user point of view?

These are discussed below in some detail.

A. Selectors: Who selects? Who is the person or people who make the ultimate judgments? This is one of the perennial problems of all information systems particularly including information consolidation units, fraught with many problems and implications. Involved is the necessity to balance (i) subject expertise, (ii) user sensitivity, (iii) information expertise, (iv) economic considerations, and (v) other indirect (but powerful) aspects, such as political considerations. In different systems selectors can be found to be:

* information specialists, librarians with necessary subject knowledge
* experts in given subjects
* committees involving either one or both
* committees involving users.

Information specialists and librarians who have familiarity with the subject can be and often are among the best selectors because they often combine a knowledge or sensitivity of all of the five aspects enumerated above. However, the more the subject becomes specialized the more there is a need to use subject experts as selectors. Quite often selection committees turn out to be a proper answer to the problems of balancing all of the five needed aspects; however, one has to realize that traditionally committees are not the most effective way to get a thing done. Advice from users can be sought or users can be incorporated as selectors to balance the user viewpoint. Leaving selection to information specialists without subject background has obvious drawbacks. Leaving selection to experts and users alone can also have drawbacks: this is not their vocation and they perform accordingly; their view may be narrow or even subject-biased, thus the need for cooperation.

B. Procedures for judging intrinsic values: involved is judgment of the quality, validity, and reliability of materials selected. How can this be done? There is, of course, the method of making the judgment directly on the basis of stated or unstated evaluation criteria. However, there are also methods, a bit more objective, which may aid in such a judgment. These include examination of:

* Reviews and state-of-the-art of a topic: those reviews done by recognized experts in the field, include synthesis, evaluative judgments and citations of usually highly selected literature on a given topic or subject; all of these can be used for selection. Parts of them can be used even for incorporation as information consolidation products.

* Refereeing and peer review: the method involves consensus among peers (experts) in the given area; a refereeing system has been present in some version or other from the

early days to the present, thus it has an international tradition and well defined ways and means. This method is particularly suitable for selection of scientific materials.

* Citation indexes: involves an analysis of the number of citations received by an item, an author, an institution, a journal, etc. With availability of large citation indexes such analyses are relatively easy to perform. Various other results can be obtained, such as co-citation patterns or bibliographic couplings. Citation analyses are more suitable for scientific materials, both basic and applied, however, due caution should be used because after all they provide quantitative data to be used only as a support for qualitative decisions.

In many instances, data provided in given sources needs to be examined. There are procedures (more costly and cumbersome) which may be involved, such as:

* Comparison: data on the same aspect from different sources is compared for similarities and differences and selection made accordingly.

* Testing: data is tested in a variety of ways or samples are recollected to check its reliability.

C. Procedures for judging demand and user appropriateness: these involve judging the utility of the materials which pass the selection on their own intrinsic value. Results of user studies (dealt with in topic 4) are matched against the materials. Besides the direct judgment by a selector (or selection committee) some other procedures may include:

* relevance feedback: examination of materials previously judged relevant by users and subsequent selection of similar items;

* use analysis: examination of materials previously cited, circulated, read, requested, etc.;

* demand analysis: findings about items in demand;

* user tests: talking to users; testing samples of materials and candidates for selection;

* consultation: seeking experiences from systems and situations similar to the present.

Quite often, both of the procedures for judging intrinsic merit and user appropriateness are merged into one. Even if they were not, ultimately they have to be merged. Because this is what selection is all about.

5.2 Selection policies

Selection policy sets the criteria and basis for decisions. A detailed articulation of criteria for selection is by no means an easy proposition. Therefore, it is not surprising that many systems perform selection on the basis of unstated criteria and instinct. The results may not be necessarily bad, but they are more likely to be so. There are no universal formulas for selection. Any selection involves human judgment, thus a degree of subjectivity. A well stated and officially approved policy:

* helps in reducing the inconsistencies and idiosyncracies in judgments;
* guards against gaps and biases in decisions;
* provides for more equivalence in judgments among different selectors and across a span of time;
* represents the system to its constituency and higher authorities;
* serves as a tool in communication with users as well as in promotion and marketing to users;
* provides a benchmark for evaluation of the system; also, it can be used as an answer to unjustified or uninformed criticism;
* aids in training of staff.

A selection policy should have at least three elements (of course it can have more depending on the objectives of the system):

1. Users and needs: a specific statement about population and information needs to be served, derived from user studies.
2. Subject: a specific statement about subjects, topics, problem areas or missions to be covered.
3. Materials: a specific statement about the type of information sources in the given subjects to be acquired and the criteria for their evaluation.

5.3 Selection aids

By selection aids here are meant the tools which help to identify materials appropriate for considering in selection. There is a great number of selection aids available in many general and quite a few specialized subjects. There are also a number of lists or bibliographies of selection aids appropriate

for given subjects and types of materials.

Selection aids may be grouped in the following types:

1. Basic bibliographies
2. Selected lists (including government and international organization's lists)
3. Reviews
4. Reference books and directories
5. Content tables
6. Indexing and abstracting sources and services
7. SDI (Selective Dissemination of Information) services
8. New titles information, publisher's catalogs
9. Invisible colleges

Description of these aids can be found in numerous other courses in library and information science.

5.4 Criteria for selection and evaluation

Evaluation is concerned with the determination of the intrinsic merit, validity and reliability, or in short, the quality of information sources which will eventually be consolidated. But what is qualitative information? This is a perennial question which is a critical problem in a much broader context than information consolidation, particularly in science and technology. Unfortunately, there are no formulae or fully objective criteria for measuring information quality. However, there is often a consensus of what is information of higher quality, what is of lesser quality, what is redundant, outdated or superseded information, and what is inaccurate, wrong, or false information. The consensus is built by applying certain criteria and tests as a yardstick against which the quality of information is judged.

A single set of criteria for selection of sources for information consolidation to cover all kinds of products for all kinds of users cannot be specified. Different circumstances and objectives will clearly demand different criteria. However, guidance for development of specific selection and evaluation criteria can be derived from some of the generally recognized criteria used in:

A. Peer review and refereeing of publications in science and

technology.

B. User evaluation of information products and services.

A. Criteria in peer review of publications in science and technology have long been used to judge meritorious work and reject work of little or no merit. These criteria are closely adaptable for selection of sci/tech sources for inforamtion consolidation. Clearly, depending on objectives of consolidation, some of these criteria may be given emphasis over others. Such criteria can be classified into those that pertain to more objective and more subjective judgments:

I. More objective criteria:

1. Underlying problems, facts, assumptions, parameters of thought: how well examined, organized, stated or recognized? Are assumptions warranted?

2. Hypothesis, question, concepts: are they clear and do they embody the problems, facts, parameters?

3. Methods: are they appropriate, competent? authoritative use of resources?

4. Analysis: appropriate? Does it follow from facts collected or observed? Relates to assumptions, hypothesis, question?

5. Interpretation: logical, common sense; strong? Does it follow from analysis?

6. Validity: does the work stick to a defined problem, parameters, questions, hypothesis? Does it do what it claims to do?

7. Reliability: accuracy; reflection of reality, degree and appropriateness of controls to eliminate biased results. Can the same results be obtained in repeated observations? Are there conflicting results?

8. Awareness: Does it show a demonstration of knowledge of previous and related works? Integration into larger body of work, knowledge?

II. More subjective criteria:

1. Problem significance: to what extent is the problem hypothesis, question investigated significant or trivial?

2. Solution significance: to what extent is the solution important or trivial? (e.g. the problem can be significant, but the solution trivial).

3. Originality: to what extent is the work unique, startling, unusual, shedding new light, enlightening?

4. Author, institution: reputation, quality of previous work, honesty, credibility, competence.

5. Value: for future work (as stimulation, encouragement, guide); for education and training; for practice; for given audience. Future impact.

6. Reporting style: readability; clarity; jargon; organization; logic of presentation; tone; color; degree of sophistication required to follow.

7. Publication: (if published, judgement on source where work is reported): reputation refereeing extent, quality of previous works reported, honesty, authority, credibility.

C. User evaluation of information services depends very much on criteria users themselves apply in judging the products and services received. These criteria can be adapted for selection and evaluation of already existing information consolidation products. From numerous studies about users, the five general classes of criteria most often applied by users are:

1. Information (or data) quality, including:
   * Precision and accuracy of information.
   * Credibility of the source(s).
   * Recency of information.
2. Scope, including:
   * Completeness of information.
   * Comprehensiveness of subject or topic coverage.
3. Appropriateness, including:
   * Fitting with needs, requirements, request; degree to which information is personalized as requested.
   * Degree of reaching or exceeding information overload or tolerance for processing information.
   * Fitting with own capabilities: language, sophistication, level.
   * Degree of opinions, extraneous, irrelevant information.
4. Haggle and hassle factors, including:
   * Time lag in receiving information.
   * Ease of usage of received information (e.g. format; additional steps required).
   * Ease of access to the service (e.g. minimum of red tape and paperwork, procedural delays, distances, channels).
   * Efforts required to get a response; support received in access and use.
5. Costs, including:
   * Direct costs of obtaining service.

* Indirect cost in accessing and using the service and in post-processing of information.

Development of criteria for selection of information sources to be consolidated is a complex process involving input from users, subject specialists, and information specialists. Again, user studies and cooperation between subject and information specialists are essential. Closely connected with criteria for selection of information sources are criteria for evaluation of information consolidation products and services, thus they are presented here together (the selection criteria are more emphasized under A above and the evaluation under B). As mentioned, adaptation to specific circumstances will have to be made depending on specific objectives of an information consolidation unit. Furthermore, criteria for evaluation by users can also be utilized in user studies (topic 4) and market research (topic 11).

Teaching Suggestions

The selection process and evaluation criteria are covered in some detail in Handbook [6], Chapter 6 and 7, pp. 99-146. A number of enumerations from these chapters are repeated in the preceeding narrative to provide for possible organization of lectures.

It may be useful to assemble a variety of selection aids as enumerated to show them as examples and to have them available for examination by participants.

A possible assignment is for participants to describe a set of selection tools and/or construct a detailed selection policy statement for a specific information consolidation unit as specified by the instructor or choosen individually by the participants.

The topic can be divided into three lectures: first covering the elements in the selection process (topic 5.1), the second, selection policies and aids (topics 5.2 and 5.3) and the third, evaluation criteria (topic 5.4). The lectures should be accompanied with examples from the participants environment.

Chapter II-6

SIXTH TOPIC: OVERVIEW OF THE METHODS AND PRODUCTS FOR INFORMATION CONSOLIDATION

Instructional Objectives and Rationale

The objectives of the sixth topic are to:

1. Provide an overview of the methods involved in any and all kinds of information consolidation products.

2. Discuss steps involved in analysis and synthesis of information.

3. Present considerations for restructuring and targeting of information, together with examples for different information products targeted at different audiences.

This topic follows from the topic on users (Topic 4) and the topic on selection and evaluation (Topic 5) by showing how the results of user studies and selection of sources are translated into information consolidation products. While this topic deals with general principles applicable to construction of all kinds of products, the next two topics (Topics 7 and 8) provide discussion of more specific products. In this sense, this whole area (Area D: Processing Methods and Techniques) proceeds in three topics from generic to specific.

Outline of Topic 6

6.1 Analysis and synthesis of information
Processes of determining and isolating salient information and of condensation and distillation of analyzed information. Steps in analysis and synthesis. Relation to evaluation criteria.

6.2 Targeting and restructuring of information
Translating user studies and synthesized information into information consolidation products. Targeting to diffusion or transfer of information stages. Restructuring of content aspects.

6.3 Examples of information consolidation products
Examples of products targeted to various diffusion stages and various user groups or organizations.

Narrative of Important Points in Topic 6

6.1 Analysis and synthesis of information

Analysis is the process of determining and isolating the most salient information conveyed by a given information source and separating this information into its constituent elements on the basis of predetermined evaluative criteria and user needs. In other words, once the information sources have been selected, they must be examined in order to extract the main points of information to be synthesized and/or repackaged. Here is meant evaluative analysis and not only analysis to determine contents as done in indexing. Thus, evaluation criteria as discussed in topic 5.4 are crucial in analysis for information consolidation.

Following selection and evaluation, information is eventually analyzed and then synthesized for use in products and services for dissemination to users. The problems of analysis and synthesis start long before any actual analysis and synthesis take place. Namely, analysis and synthesis cannot be performed in a vacuum. Prior to analysis and synthesis these aspects have to be resolved:

1. Determination of an organizational and systematization pattern for the contents or characteristics of information to be analyzed and synthesized, i.e. creation of a table of contents, a classification or codification scheme, a typology, or key to characteristics on the basis of which information is first analyzed and then synthesized.

2. Consideration of the objectives, resources, constraints within which analysis and synthesis are to be performed.

3. Determination of evaluative criteria for use as the basis for analysis and synthesis.

Without specific guidelines from these three areas no meaningful and rational analysis can be performed.

Although analysis and synthesis are closely related (synthesis cannot be performed without an analysis done first) the requirements are somewhat different, thus they are worth enumerating.

Analysis requires:

* specification of the topics in relation to which information will be analyzed and extracted from a set of selected documents.

* specification of a scheme for organizing and systematizing information (as described above)

* specification of procedures for extraction of the relevant information or data

* assessment and verification of the extracted information or data into given classes or headings

Synthesis is a process of condensation and distillation of analyzed information from one or more sources and presentation of information in a new arrangement or structure with an interpretive or evaluative point of view. Obviously, synthesis follows analysis.

Synthesis requires:

* comparative arrangement of the extracted information from many sources

* comparison of data from different sources; derivation of a consensus and resolution of possible conflicting information

* compression or merger into a structure or form most suited for intended users and uses

* evaluation of the final result.

6.2 Targeting and restructuring of information

At this stage, results of user studies are in, information is selected and analyzed and grounds for synthesis are prepared. Now what? Now comes the difficult and creative task of using the results in determining and developing information products that will:

(i) satisfy the uncovered or anticipated user needs in given subjects and fit their communication practices on one hand, and

(ii) reliably reflect the state of knowledge in the given subject on the other hand.

Thus, information consolidation products are determined with one eye on the user and with the other eye on the best available information on the subject. This means decisions on:

A. Targeting to stages in information diffusion or transfer

B. Restructuring the content aspects of synthesized information

A. Targeting to stages in diffusion or information transfer means orienting specific products for specific audiences to stages and events in information transfer. As mentioned in topic

4.3, five stages are considered:

1. Awareness: exposing the users to the general existence of an innovation or idea. Creating general consciousness through examples. Fixing attention and guiding the users to the next and more substantive sources of information.

2. Interest/Knowledge: Awakening further interest. Providing basic details of the innovation or idea (e.g. technology). Creating a cognizance of the knowledge, know-how and steps needed for trial and adoption. Guiding to sources that will stimulate further learning and eventual trial, and decisions on adaptation.

3. Attitude Formation: relating the innovation or idea to user needs and functional answers within the users' situation. Informing the users of the general utility of the idea or innovations. Giving enough detail to compare this idea or innovation to others in users' own environment. Guiding the users to information sources that will generate appraisal, trial, and decisions and persuading them to do so.

4. Trial/Decision: providing applied details to measure performance or applicability of the innovation against requirements. Assisting the users in obtaining evaluations i.e. performance data on the specific utility of the innovation to their particular situation. Directing the users to sources that facilitate trial and decisions. Guiding them to sources for additional technical or operational details.

5. Adoption/Confirmation: providing information confirming users' decision and reducing dissonance. Providing continuing information to satisfy requirements of the modified environment of users (i.e. as changed after adoption). Directing the users to sources of continuing operational support and/or providing such sources.

B. Restructuring of content aspects requires the determination of a mode and language in which the contents of information consolidation products will be presented to users in a way that is most compatible with users' situation and needs and that will enhance the comprehension and assimilation of information presented. More specifically, restructuring requires determination of:

* extent to which available content is to be incorporated (subject breadth and depth)

* degree of invariability of information as found in the original text and the degree to which new information (points of view, comparisons, etc.) is to be added

* degree of detail in information (specific to general)

* degree of changes in sequence of presentation relative to the original

* technical sophistication (minimal, moderate, high, very high)

* temporal aspects (timeliness, time spans covered, frequency of issue)

* editorial qualities (grammar, clarity, balance, logic of presentation)

6.3 Examples of information consolidation products

A large array of products are possible; major types include:

*Reviews: critical reviews, state-of-the-art reports

*Reports: assessment, market, and technical reports; alerting bulletins or newsletters

*Data: data compilations and tables; statistical abstracts, correlations, and composites; critical data

*Databases: expert databases; subject knowledge bases

*Technical writings: guides, manuals, instruction sheets, explanations on a complex subject provided in a style and language geared toward a given audience level. Popular articles about a scientific or technical topic

*Handbooks: compilations of essential data and information on a subject

*Critical Studies: comparison of different practices or policies with pro and con listings; impact and future studies

*Requests: evaluative on-demand studies and compilations; briefings.

Of course, each of these products has its own requirements, criteria, and procedures. For instance, criteria and practices for reviews are quite different from those for technical writings as shown in topics 7 and 8. Many (if not all) products will require more or less restructuring of synthesized information.

Table 3 in topic 9 provides a general list of products related to different stages in information diffusion or information transfer and to different audiences or organizations.

Teaching Suggestions

The analysis and synthesis of informatin are covered in the Handbook [6] Chapter 8, pp. 147-154, and the restructuring and targeting in Chapter 5, pp. 85-98. The book by Rogers [16] provides a description of diffusion of information processes, together with description of stages in diffusion.

Numerous examples of information consolidation products are provided in the book by Valls [13], particularly in the Appendices, pp. 80-110.

The Appendix at the end of this report provides a list of information analysis centers that could be contacted for brochures and product examples. A most comprehensive directory that can be used for the same purpose is compiled by H. Lengenfelder [20].

It may be useful for this topic to enlarge the assembly of information consolidation products used in topic 2 and to classify them as useful for different diffusion or transfer of information stages.

A possible assignment is for participants to start designing their own information consolidation product related to the user study (or class studies) performed as an assignment for topic 4.

The topic can be divided into two lectures, the first covering the analysis and synthesis of information (topic 6.1) and the second restructuring and targeting (topic 6.2). In addition a demonstration session could be held to present and discuss various products as they relate to various audiences.

Chapter II-7

SEVENTH TOPIC: REVIEWS AND RELATED PRODUCTS

Instructional Objectives and Rationale

The objectives of the sevent topic are to:

1. Discuss in some depth reviews and related products as some of the most often found products in information consolidation units, and information analysis centers in general.

2. Enumerate characteristics and functions of critical reviews, state-of-the-art reports, and handbooks.

3. Provide criteria for evaluating reviews.

Topic 7 on reviews follows directly from topic 6 on methods and products for information consolidation. This topic is a specific example of a class of products found quite often in the practices of information analysis centers, which after all are one type of information consolidation units. While production of reviews often requires specialized subject knowledge, information professionals can participate in the process and even direct it. Thus it is important for them to be acquainted with the nature, functions and evaluation of reviews.

Outline of Topic 7

7.1 Characteristics and functions of reviews
Bibliographic and didactic role of reviews. Critical nature of reviews. Historical or subject functions of reviews. Contemporary or user functions.

7.2 State-of-the-art reports
Emphasis on up-to-dateness. Short time span. Major types of uses: state-of-the-art technology; market reports; statistical composites.

7.3 Handbooks
Types of handbooks: compilations of critical data and formulae; guidelines for accepted, tested, or recommended procedures and processes; required and/or recommended standards.

7.4 Evaluation of reviews
Criteria for evaluating reviews stemming from their dual, bibliographic and didactic function.

Narrative of Important Points in Topic 7

7.1 Characteristics and functions of reviews

Review is a critical synthesis of the state of knowledge in a given subject or topic; it is a critical examination of information and literature on a subject or topic accomodated in its broader format. In the spectrum of many possible information consolidation products, reviews take a special and most significant place. They are the highest level of intellectual re-processing of information. By 'review' we, of course, mean the critical, evaluative review and not just a summary of who said, wrote, or did what. Thus, a bibliographic essay, an annotated bibliography, or a fact-report are not a review in the true sense of the word.

The procedures for making reviews are in essence those presented in topic 6.1 on analysis and synthesis of information. Two types of reviews are distinguished: (i) bibliographic, emphasizing the literature-oriented or bibliographic approach evaluating contributions in a subject or topic within a defined period of time (e.g. annually), and (ii) didactic a subject-oriented approach focusing on a particular scientific or technical problem and its solution. Many reviews combine the bibliographic and didactic role into one, the proportion varying according to the aim and audience for the review.

There are two types of functions or uses of reviews: (i) historical - those which are fundamental to development of a subject or topic and (ii) contemporary - those which are beneficial to individual users. Reviews can be deliberately structured to emphasize some of the functions and encourage some of the uses. Among the historical or subject functions are:

1. The peer evaluation of published literature: passing of judgement on what is worth saving in a literature.

2. Collation of information from different sources: this acts as a unifying process for a subject or topic and provides a continuing conceptual framework in which individual works may be viewed in perspective.

3. The compaction of existing knowledge: Extracting the parts of the papers containing new information only, leaving out portions that pertain to verifications, discussions, methods, etc., already known or subsumed.

4. The superseding of primary documents as the written record: replacing of many scattered documents with one.

5. The identification of emerging specialties: by bringing together various works, the emergence of a new area may well be first identified in a review.

6. The direction of research and work: suggestion for further work.

Among the contemporary or user functions are:

1. Informed notification of the published literature: enables individuals to concentrate on the more worthwhile papers; summary of that which is worth knowing; selection aids.

2. Current awareness of related fields: Enables individuals to keep abreast of advances in field adjacent to own. Particularly useful for cross-fertilization of ideas among different subjects or topics.

3. Back-up for other literature searching: serves as a starting point for searching of more current materials not yet in reviews.

4. Searching for alternative techniques: helps in resolving methodological problems in own work; providing data; reference aids.

5. Initial orientation in a new field: provides basic didactic and bibliographic information from which to continue work in a new subject or topic.

6. Teaching aids: supplements and even replaces textbooks.

7. Feedback: provides a measure of a researcher's own published works. (The reviews are fairly heavily used for this function).

8. Inspiration: provides suggestions and ideas for further work; stimulation for putting research into practice.

7.2 State-of-the-art reports

These are types of reviews which do not have an all-encompassing scope and historical orientation. They emphasize recency and up-to-dateness. Their aim is to describe a very recent situation when they reach their audience. Thus, they are more timely than the traditional review, so they are mostly a current awareness tool. In order to achieve this currency, state-of-the-art reports are often published as informal reports, prepared on demand, oriented to a restricted audience, sold at high prices, and becoming obsolete quite fast.

The state-of-the-art report is used mostly in relation to technological topics and in business and commerce. Description of a few major types and uses follow.

1. State-of-the-art of a technology: these summarize,

compare and evaluate the advances, characteristics and/or utilizations of a given technology or technological product or process. These differ according to intended use and audience emphasizing:

* technical and engineering aspects: oriented toward technical personnel and engineers in particular. Used primarily in technology design, deployment purchase recommendations, comparison of characteristics and alternatives and keeping up to date with technology.

* use aspects: oriented toward users of technology. Emphasizing details, characteristics, requirements and economics of use (as opposed to details of technical design as in the type above); including comparative reliability, durability, complexity, prerequisites to use, ratings.

* management aspects: oriented toward policy makers on a higher level (e.g. ministry officials, lawmakers, delegations, government representatives, planners, funders). Stressing impacts (social, environmental, economic, etc.); strategic requirements and comparisons; political consideration; international aspects; experiences in other countries, particularly in similar situations, etc.

2. Market reports: these summarize a state of an industry or a market in terms of its existence, financial strength, economics, profitability, deployment, growth, characteristics, gaps, trends, potential, etc. As in technological state-of-the-art reports, these can similarly be oriented toward different uses and clientele. Their main use is in market decisions and strategic planning, considerations of competition, opportunities, and the like.

3. Statistical composites: these are statistical correlations in a wide variety of technical, market, demographic, scientific and other areas. Specifically composed and evaluated to show cross-dependence of trends, situations, results. May accompany any of the previous types or stand alone, with or without interpretation and can be used for briefing of decision makers.

7.3 Handbooks

A handbook is a review concentrating on critical data (including chemical structures, mathematical formulae, and the like) and/or guidelines for accepted and tested procedures, techniques, processes, and standards. They are very popular and have widespread uses, particularly in science, technology,

industry, manufacturing, health care and the like. There are a number of types of handbooks, the main ones being:

1. Compilation of critical data and formulae on specific substances, processes, observations and/or phenomena. These are used mostly in science and technology for experimentation, design calculations, construction, safety considerations, maintenance, replacement, comparison, etc. Publications of evaluated data from social science data archives or census data are also examples of this type of handbook.

2. Guidelines for accepted, tested, and/or recommended procedures and processes. They are aimed at actually doing things, for decisions related to processes and procedures, and for learning as well. They range from step-by-step pamphlets, to how-to books and manuals, to extended discussions of options in given processes.

3. Description and/or references of standards to be applied in doing things. These can incorporate required standards (as in electrical installation) or recommended standards (as in bibliographic work). They can range from tables, to descriptions, to discussions aimed at promoting harmonization and interconnections.

7.4 Evaluating a review

In many instances reviews from various information sources are considered for use by information consolidation units. In such a case reviews need to be evaluated as critically as the primary literature. Furthermore, reviews as a product of information consolidation units need to be evaluated. Thus, it is of importance in both respects to have criteria for evaluation of reviews.

Most of the criteria enumerated in topic 5.4 (on peer review and refereeing and on evaluation of information sources) apply to evaluation of reviews as well.

However, there are a few more criteria for reviews, stemming from the unique dual nature and multiple functions of reviews (as discussed in topic 7.1). These additional criteria pertain to:

1. Completeness: the degree to which both the subject and the literature on the subject were covered; the degree of insight shown.

2. Perspective: purpose, direction, orientation; the degree of appropriateness in relation to both a given subject and for a given audience.

3. Analysis: the thoroughness, depth and breadth of

analysis; degree of collation of information from different sources; degree of evaluation applied in analysis.

4. Synthesis: degree of compaction and relations drawn; extent of superseding of previous information and literature; power of inferences; degree of drawing from related subjects; degree of evaluation applied in synthesis.

5. Value added: identification of emerging specialties; introduction of new hypotheses or theories; suggestions for future work (research, translation into practice, etc.); serving as an inspiration, stimulus.

6. Utility: the degree to which a review can serve multiple functions (e.g. as enumerated is Section 7.1) and not only one or two functions.

Teaching Suggestions

The various types of reviews and the criteria for review evaluation are provided in the Handbook [6], Chapter 9, pp. 155-167. Examples of three types of reviews are given in Chapter 7, pp. 129-146.

A number of examples of reviews, handbooks, and state-of-the-art reports can be assembled (if they were not already assembled in connection with previous topics) and displayed and discussed as examples.

If there are any information analysis centers available in the vicinity a visit may be arranged at this time to incorporate discussion of their products, particularly involving this and the next topic. By this time the participants should be well acquainted with information consolidation to critically observe, the processes and ask penetrating questions.

A possible assignment may be a description of products and processes at the information analysis center visited. Another assignment may be the writing of a short critical review from a set of articles and documents on a subject assembled by the instructor. The subject should be within the realm of familiarity by participants.

The topic can be divided into two lectures: first discussing the functions, types, role and evaluation of reviews, and second concentrating on specific examples of state-of-the-art reports, handbooks and critical reviews.

Chapter II-8

EIGHTH TOPIC: TECHNICAL WRITING AND POPULARIZATION FOR MASS USE

Instructional Objectives and Rationale

The objectives of the eighth topic are:

1. Discuss in some depth technical writing as one of the main techniques for producing information consolidation products for wide use.

2. Enumerate elements to consider in the selection of an audience and sources, and application of writing principles.

3. Provide a set of criteria for evaluation of technical writing.

Two classes of information consolidation products have been selected for in-depth treatment, reviews treated in the previous topic, and technical writing treated in this topic, because they represent the major classes of information consolidation products. While reviews are directed more toward specialists and more sophisticated audiences in a subject, technical writing is directed more toward lay people and audiences with lesser sophistication in a subject. Thus with these two classes of products a large spectrum of audiences is covered.

Outline of Topic 8

8.1 Concept of technical writing and popularization of science and technology
Orientation and aim of technical writing. Concern with message to be conveyed. Considerations in planning of technical writings: audience and human psychology; subject and source; message and use; and writing principles.

8.2 Audience and sources
Factors to be understood about an audience, tangible and intangible factors. Array of sources of information of use in technical writing. Role of subject specialists as information sources.

8.3 Rewriting principles and Evaluation of Technical Writing
Role of general principles of good writing. Specific principles involving accuracy, logical progression, simplicity, word choice, style, grammar, analogy, and sensitivity. Criteria that are relevant for evaluation of technical writing in all languages.

Narrative of Important Points in Topic 8

8.1 Concept of technical writing and popularization in science and technology

While much of the scientific and technical literature contains information potentially useful to a wider audience than just the immediate specialist, most of it can be followed by only the highly initiated. In part, this is because of the complexity of the subjects covered in the literature; however, in good part this is also because of the way that the literature is written. The language and style found in scientific and technical writings is a most effective barrier for their wider use. Yet there are many situations where advances in science and technology are highly relevant for everyday use or for decision making by various officials, businessmen, etc. Thus, for a long time there was a need felt to produce writings that would translate the scientific and technical literature and information into a style, presentation and language which can be followed by people other than the subject specialists or highly sophisticated laypeople. A generic name for such translation or transformation efforts is technical writing; often the term "popularization of science" is used as well.

The aim of technical writing is effective application and wider understanding of scientific and technical knowledge and advances. Technical writing is the restructuring of scientific and technical information to the level of a given audience. In other words, technical writing is concerned that a message be conveyed, understood and absorbed in a way that can be used by the largest number of people in a given social group or audience in the shortest possible time. The principles of technical writing developed above and beyond information consolidation are of great relevance to information consolidation efforts. Here are some of the major aspects to consider in the planning of technical writing:

* Audience and human psychology: to whom will the message be conveyed?
* Subject and source: what subject or topic will the message cover and from what source(s) will it be synthesized?
* Message and use: what is it that should be conveyed and for what use?
* Writing principles: how should it be conveyed?

8.2 Audience and sources

Reaching an audience is the aim of technical writing. Thus technical writing starts and ends with consideration of an

audience; it tries to overcome the language problems and psychological barriers in relation to an audience.

The important factors to be understood about an audience are myriad. They may well be selected from the variables involved in users and uses as elaborated in topic 4.3. (The methods for audience or user studies are elaborated in topic 4.4)

It is important to consider not only the tangible factors but also the intangible ones, such as respect for and enhancement of human dignity, awareness of sensibilities, life-styles, etc. One should also consider that the human mind can only process a limited amount of information at a time, that too many facts or ideas in a short space make comprehension difficult, and that writing and comprehension levels have to be matched.

The subject of technical writing may be derived from study of information needs of an audience, given by an organization, or even it could be dictated by itself from the advances in a topic, existence of a product or process and the like.

Any of these cases involve a selection of sources from which the technical writing will proceed; the selection criteria and processes as treated in topic 5 are clearly relevant. The sources can be one or more combinations of these:

* open literature as available in journals, books, monographs, proceedings, etc.

* fugitive literature as available in reports.

* internal documentation as available in organizations (industries, institutes, agencies) such as laboratory reports, internal memoranda and reports, work specifications, correspondence, blueprints, etc.

* subject specialists: interviews with scientists, engineers and other specialists.

All the sources have to be selected and evaluated according to the criteria elaborated in topic 5.4. But, let us elaborate on the last source mentioned: the subject specialist. Technical writers usually have some background in science or technology, but in no way can they be specialists in every possible subject that becomes the topic of their technical writing. They have to rely more often than not on subject specialists for technical explanations. They also may often be in a position to interview subject specialists (e.g. engineers working on a project or product) as a sole source for a given write-up. Careful interview techniques have to be developed that will elicit proper response and in addition educate the specialists on the importance of technical writing and even make them appreciate it and reduce the problem of acceptance of technical writers and technical writing.

8.3 Rewriting principles and Evaluation of Technical Writing

Not all the details of a scientific or technical subject can and should be presented in a technical writing. Many details are irrelevant for a given audience and given use. In that respect it is of utmost importance to select precisely the details or message about a subject that should be conveyed. The principles of targeting and restructuring covered in topic 6.2 are of direct relevance here.

A clear outline of the message should be developed before any writing. The ouline will help both, in focusing on the messge and organization of the presentation.

To be effective technical writing has to adhere to principles of good writing in the given language in general, and to other more specific principles in particular:

1. Accuracy: make sure that the material selected for technical writing is accurate in accordance to the most up-to-date information available.

2. Logical progression: follow a logical progression of thought.

3. Simplicity: keep it simple.

4. Word choice: select words for precise communication, avoid jargon.

5. Style and grammar: choose style and grammar for direct and effective communication, not art.

6. Analogy: make liberal use of examples familiar to audience.

7. Sensitivity: follow any restrictions and adhere to the sensitivities of the audience.

The evaluation of technical writing in a given language should first and foremost by subjected to the criteria of good writing for that language. Languages do differ, so do criteria. We cannot state what are such criteria in different languages, but we shall concentrate here on some criteria that are relevant for evaluation of technical writing in all languages. Clearly, these are closely connected with rewriting principles elaborated above.

1. Subject or topic: Is it well selected? Clear in its borderlines? What is the degree of detail? Necessary detail, unnecessary detail? Is it simple?

2. Message: Is there a focus? A central theme? An orientation? A need for that or some other message on the subject? Are the meaning and intent clear?

3. Audience: Does it address an identifiable audience, level, social group? Is it in accordance with such an audience? Scaled to an audience?

4. Accuracy: Is it accurate? Factual? Reliable? Has it any purely speculative conjectures or conclusions? If so, are they clearly identified as such?

5. Logic of presentation: Is it logical? consistent? Do facts, ideas ... build on each other, starting from basic or simple to more complex? Is the sequence right for easy following? Are all parts relevant to the whole?

6. Terminology: How much technical jargon is there? Are new words identified and defined? Are new words easily acceptable? Is there any unnatural or specialized use of familiar words?

7. Grammar: Is the grammar the accepted "spoken" grammar? Is it academic? Or as used in legal, business, technical government ... writings? Are sentences short enough? Are subject, verbs, and associated phrases clearly related?

8. Style: Is it appropriate? Interesting? Boring? Is the title appropriate? Are the lead-ins and endings foreceful? Written in active voice? Is there a unity of mood? Unity of tenses? Any humor? Is there a human interest element?

9. Analogies: Are there any examples at all? Are they appropriate, related to the experiences of the audience? Are the quantities also given in terms of a human scale, easily understood.

10. Sensitivity: Are cultural, economic, social, political realities taken into account? Are there any faux pas of linguistic, social convention or similar nature? Is there recognition of moral and ethical aspects? Is the whole think stimulating, inspirational?

11. Packaging: Are the graphic, sound or visual aspects well done (print, graphics, illustrations, ... or in the audiovisuals: picture, sound, film)? Do the arrangements make for easy reading (viewing, listening)? Does the packaging entice?

Teaching Suggestions

The principles of technical writing, the criteria for evaluation, and two examples are provided in the Handbook [6], Chapter 10, pp. 168-194. A number of examples can also be found in the book by Valls [13], dispersed throughout the book.

The Biogas Handbook [7], Windpump Handbook [8] and Cooking Stove Handbook [9] published by Unesco are good examples of information consolidation products using the principles of technical writing. These Handbooks are intended for mass use by communicators, such as extension workers.

If there are any extension services or public health units that produce information consolidation products (popular pamphlets) in the vicinity, a trip could be arranged at this time to provide an insight into production and dissemination of such products. Alternatively, a representative may be invited to present a lecture and demonstration for the class.

A possible assignment may be a technical writing product derived from sources provided by the instructor. A contest could be arranged to judge the most effective product in conveying a message. Alternatively, instructor could assign a message and let the participants select the relevant sources, synthesize information from them and produce a product for mass use.

The topic can be divided into two lectures: first lecture covering the concept of technical writing, and audience and sources, and the second the rewriting principles and criteria for evaluation. In addition, a workshop may be arranged where specific technical writings are disected and produced as well.

Chapter II-9

NINTH TOPIC: PACKAGING MEDIA AND FORMATS

Instructional Objectives and Rationale

The objectives of the ninth topic are to:

1. Present the basic concepts and effects associated with packaging of information, stressing the importance of paying close attention to packaging.

2. Outline the types and characteristics of packaging media and formats.

3. Describe a number of possible products and packaging media appropriate for given circumstances.

The work of information consolidation is not finished with synthesis and restructuring of information. Selection of appropriate media and format for packaging of information requires careful consideration, as well. Today more and more media are available in addition to print. Thus in packaging not only print but also many non-print media are discussed.

This all suggests a wide range of possible products to choose from in order to enhance comprehension, acceptance and use of given consolidated information. Such products are discussed in this topic. This discussion is connected with the discussion on users in topic 4.

Outline of Topic 9

9.1 Concepts, effects, and importance of packaging
Definition of packaging and packaging media and formats. Enhancement of use, assimilation and recall. Issues in packaging.

9.2 Packaging media and formats
Effect of modern technology on packaging media. Types of media used in packaging. Formats and principles which enhance acceptance and use.

9.3 Choices in products and media
Examples of products appropriate for given stages of information diffusion or transfer. List of possible products in given media.

Narrative of Important Points in Topic 9

9.1 Concepts, effects, and importance of packaging

Packaging of information is a physical recording, arrangement and presentation of information on a given medium and in a given form. By packaging media is meant the physical substance on which information is recorded, displayed, or presented. By packaging formats is meant the arrangement, shape, and lay-out of information in a given product on a given medium.

Selection of packaging aspects involves determination of the media and formats in which an information consolidation product could be presented to users. The major issue is this:

> which media and formats should be used in order to enhance the potential use of an information consolidation product and contribute to the comprehension, assimilation and recall of its contents by users?

The way information is packaged cannot improve its content but it certainly can enhance its use, assimilation, and recall. True, a book or pamphlet should not be judged by its cover, but a well designed cover, attractive layout, appropriate format, legible print, presence of illustration... helps in a book's or pamphlet's favorable reception and spread, as well as in reading, absorption, and recall of its contents. The package in which information appears is often a decisive factor in acceptance or rejection of the whole, even before the contents have been considered; and it certainly is a factor in the amount of use. The same content in different packages does receive different usage, does affect the rate of assimilation and does make recall dissimilar.

Unfortunately, in practice principles of good packaging are often not followed. Too often the products are illegible, unreadable, overcrowded, unattractive, unbalanced ... or plain ugly. The cost is cited as a major factor for such situations, however, more often than not it costs the same to produce a well packaged product as a badly packaged one. Since packaging does affect acceptance and use of a product considerable attention has to be paid to decisions on packaging media and formats.

9.2 Packaging media and formats

The ways and means of packaging information was always affected by the technology of the day and age. Today there is a revolution in such technologies.

Printing technologies, which predominated for half a millenium, underwent significant changes in the last 25 years, comparable to the change from the Wright brother's plane to

spacecraft. And new technologies came about to supplant and even challenge print: film, phonorecords, cassettes, ... and now the videotapes and videodiscs ... Furthermore, the computer and other electronic technologies have left their lasting imprint on information packaging.

But, the most revolutionary step is not the spectacular jumps within any one of these technologies, but rather the combination and integration (through electronic technologies) of the means of production, processing and packaging of information with those of its dissemination and display as exemplified by radio and television broadcasting, online searching, satellite communication, teletext (text pages on TV) and videotex (interaction with a database via telephone and TV), etc. These integrations are having a very significant effect on every aspect of information generation, processing and use. Consequently, they have a far reaching impact (for better or worse) on our civilization, on the way we communicate and do things, and thence, on the way we live.

A number of media are available, and as mentioned, new ones are being constantly developed, thus the choices are wide. The basic media for information packaging can be subdivided into:

1. Print media, subdivided into:
   1a. Print-hard copy
   1b. Print-microimage (micrographic copy)

2. Audiovisual media, subdivided into:
   2a. Visual media - still images
   2b. Visual media - moving images
   2c. Audio media
   2d. Any combination of the three

3. Electronic media - radio, television, computers, telecommunications

4. Interpersonal contacts (as a medium)

Each of these has different requirements, criteria, procedures and technology for creation, and most importantly different economics.

Obviously, these media can be used in various combinations with each other. Selection of media for packaging in information consolidation should be user- and not media-oriented. In user-oriented packaging it is helpful to think first about humans, their senses and requirements and then about appropriate media and formats.

Similarly, numerous formats are available to be used for arrangement and presentation of consolidated information in any of the media. Specific formats are clearly dependent on the specific medium used for a given product. However, some

principles of effective formatting (in the sense of enhancement of human information processing--cognition, comprehension, association, retention, and recall) are valid for any number of media. Among these are adherence to well known principles that will enhance rather than detract from:

1. Readability: human information processing where reading is involved
2. Viewability: ...where viewing is involved
3. Audibility: ...where listening is involved
4. Identifiability: perception and cognition of key informational elements
5. Mnemonics: visual or audio associations

When a media and formats are chosen one should ask if the given choice contributes to readability, viewability, etc. The choice of a particular format should reflect not only the requirements of the physical medium but also:

(i) the content and nature of information to be presented,
(ii) the users and their environment, and
(iii) the means or channels of dissemination of and user access to information

Human information processing can be improved by appropriate media and formats geared to given users and uses. Thus, decisions on packaging (i.e. media and formats) are far from trivial and should be approached with a care equivalent to decisions on the contents of the product.

9.3 Choices in products and media

Table 3 provides a list of possible information consolidation products as appropriate for: (i) different stages in information diffusion or transer (discussed in topic 4) and (ii) different types of users-organizations and individuals.

Table 4 provides a list of possible information consolidation products in different media. Both, of these tables are self-explanatory.

Teaching Suggestions

Packaging media and formats are treated in the Handbook [6] Chapter 5, pp. 91-98 and Chapter 11, pp. 195-238. Chapter 11 contains examples of different packaging formats. Additional examples can be found in Valls [13] throughout his book.

TABLE 3: EXAMPLES OF INFORMATION CONSOLIDATION

Products by Diffusion Stages

Type of Organization	Awareness	Interest/ Knowledge	Attitude Formation	Trial/ Decision	Adoption/ Confirmation
Small Industry	Advertising announcing reports on a particular product/process. Promotional brochure. Newsletter.	Reports. Group seminar. Visits. Briefings. Exhibit. Synthesis of requirements. Data.	Seminar on effects. Comparative statistics. Report on alternatives and experiences. Videotapes, films.	Demonstration. Technical manuals. Graphic displays. Data books. Handbooks.	Operational manuals. Market reports. Handbook.
Medium Industry	Brochure describing product/process of interest to technical personnel. Market description for managers.	State-of-the-art review describing technology. Resource and economic analysis or summary.	Comparative experiences. Critiques. Market analysis.	Demonstration. Technical assistance manuals. Films, tapes, pictures. Data books.	Operational manuals. Updates. Trends. Synthesis of advances. Handbook.
Large Industry	Alerting bulletins. Newsletter. Technical news synthesis. Market trends.	Individual seminar on new developments. State-of-the-art. Economic analysis. Synthesis of research results. Critical data. Reply to inquiry.	Competitive analysis. Impact analysis. Historical review of similar efforts. Evaluations.	Demonstration. Testing reports. Technical manuals. Training manuals. Tables of recommended data.	Operational manuals for different levels of personnel. SDI synthesis of advances. Continuous critical and recommended data.

TABLE 3 - CONTINUED

Type of Organization	Awareness	Interest/ Knowledge	Attitude Formation	Trial/ Decision	Adoption/ Confirmation
Local Government	Promotional brochure. Press release. Newsletter announcing reports on topics of local interest.	Workshop for officials. Reviews. Statistical synthesis. Visits. Analysis/synthesis of practices.	Impact analysis. Comparative data. Demonstration. Briefing.	Manuals for implementation. Comparative experiences. Referral. Documentation.	Recurring supply of synthesized information. Establishment of question-answering procedures.
State Government	Announcements. Form letters. Presentation at meetings. Newsletter. Alerting bulletin.	Slide/tape descriptions. Briefing. Reviews. Statistical composites. Synthesis of research findings. Data tables.	Historical data. Comparison with other countries. Demonstration. Impact analysis. Evaluations. Integrative future studies.	Synthesis of practices and trials. Manuals. Referral. Documentation.	Recurring supply of synthesized information. Evaluation reports.
Mass Urban Population	Newspaper articles. Announcements on radio, TV. Popular talks on a given practice or product. Question-answer sheets.	Radio, TV shows. Popularization articles. Simplified pamphlets, brochures. Comic strips. Photonovels. Demonstrations. Exhibits. Popularized journals. Field manuals.	Comparing with other practices. Demonstrations. Synthesis of fitting with daily life. Possible impacts, positive and negative.	Show-how information. Simplified manuals. Do-it-yourself booklet.	Synthesized information fortifying and refining the practice

TABLE 3: - CONTINUED

Types of Organization	Awareness	Interest/ Knowledge	Attitude Formation	Trial/ Decision	Adoption/ Confirmation
Mass Village Population	Radio announcements. Visits with opinion leaders. Posters, graphic displays. School talks. Training sessions for extension workers.	Extension service demonstrations. Simplified pamphlets. Field manuals in various media (e.g. picture books, comic strips). Graphic displays. Films. Talks.	Talks by opinion leaders. Comparison with other villages. Synthesis of fitting with village life. Impacts. Summary.	Show-how information. Field manuals. Experiential information. Markets for cash crops. Do-it-yourself booklets.	Reinforcement information. Comparisons. Refinements. Increased know-how information. Market enlargement information.
News Media	Press release. Invitation to demonstration. Press clippings from foreign or technical press. Alerting bulletin.	Demonstration. Popularized articles. Synthesis of findings and results elsewhere. Timetables. Plans.	Graphic material. Comparative data. Briefings and news conferences.	Short guides. Interviews with experts, leaders.	Reports on applications. Articles on refinements. Result analysis. Impact analysis.
Academic/ Research Institutions	Journal notices. Short announcements in professional newsletters. Acquisition notices.	State-of-the-art and critical reviews. Synthesized research results. Referral. Journal articles. Text excerpts. Critical data. Data survey.	Synthesis of critical reports and evaluations. Comparative results. Resource requirements information.	Research data. Training/education materials. Know-why information. Experiences at other institutions.	Continuing synthesized SDI reports. Selective current contents. Refinements in advances. Critical data.

TABLE 4 : EXAMPLES OF INFORMATION CONSOLIDATION PRODUCTS IN DIFFERENT MEDIA

Media	Aspect	Product
Print - paper, hard copy	Single issue (Temporal aspect)	Critical review or state-of-the-art Brochure Monograph Technical report Field manual (for operations, maintenance, processes) Guide Handbook Textbook; tutorial Question-Answer sheet Data compilation; critical data Statistical abstract Briefing; evaluative summary Directory; evaluative answers Referral; evaluative answers Printout; any of the above
	Serial (Temporal aspect)	Newsletter; alerting bulletin Journal Monthly, quarterly...report Recurring summaries, bulletins
Print - filmed copy	Microform	Microfilm; any of the above Microfiche; any of the above Aperture card; any of the above Microtext; any of the above
Print - soft copy	Cathode ray tube	Online retrieval-references, paragraphs Structural compositions Tabular data Video newsletter
Audio	Recording	Tape, Cassette, Phonodisc } of a tutorial, briefing, guide, etc.
	Telephone recorded message (dissemination-delivery)	Briefing; summary Question-Answer session Newsletter Information 'Hotline'
	Radio (dissemination-delivery)	Summary; tutorial Newsletter Radio show

TABLE 4 CONTINUED

Media	Aspect	Product
Visual	Graphics	Photograph Drawing; chart Poster Display Slide Transparency Table; figure
Audiovisual	Film	Motion picture Slide and recording Holograph
	Video	Videotape Videodisc
	TV (dissemination-delivery)	Summary; advice; tutorial Newsletter; briefing TV show
Demonstration	Fixed site	Modeling - processes, procedures, applications Test/laboratory facility Trial installation Pilot plant Exhibit
	Nonfixed site	Mobile demonstration unit Scale model
Interpersonal	Group contact (dissemination-delivery)	Lecture/talk Seminar/conference Tutorial
	Individual contact (dissemination-delivery)	Personal consulting/advice Correspondence Telephone conversation Staff visit

A book by W. Saffady Video-Based Information Systems [21] is an excellent summary of the various technologies and their applications.

The information consolidation products assembled as examples for previous topics can now be used again in this topic to discuss different media and/or formats and point out features that enhance use and assimilation and those that detract.

A possible assignment is for participants to design and layout several pamphlets or broadcasts each designed for a different audience or situation as found in their environment.

The topic can be presented in two lectures: first, describing packaging media and formats and stressing their importance (topic 9.1 and 9.2) and second, presenting in detail various options in choices of packaging media and formats (topic 9.3). At this time the assembled examples should be used in abundance.

Chapter II-10

TENTH TOPIC: DISSEMINATION OF INFORMATION CONSOLIDATION PRODUCTS

Instructional Objectives and Rationale

The objectives of the tenth topic are to:

1. Provide the general concepts associated with dissemination and communication.

2. Enumerate and discuss in detail channels for dissemination, showing non-conventional channels as well.

This is the last topic that deals with the description of processes in information consolidation. Fittingly, the topic deals with dispersement and dissemination of information consolidation products as produced by any processes described in topics 5 through 9. The stress in the topic is on description of a variety of channels available for dissemination. Included are also non-conventional channels, such as interpersonal communication to show that dissemination is not limited to distribution of pamphlets or print products only. Creativity in choice of appropriate channels is implied.

Outline of Topic 10

10.1 Concepts and problems in dissemination
Elements in dissemination. Distinction between dissemination and communication. Importance of active dissemination.

10.2 Dissemination channels
Enumeration of the more important dissemination channels, including interpersonal delivery, group delivery, strategic placement, in-house delivery, local depository, mass media, mail, telephone, and computer networks.

Narrative of Important Points in Topic 10

10.1 Concepts and problems in dissemination

Dissemination pertains to the transmission of information to users through given channels. In a practical sense, it means the spreading about, distribution and delivery of information products and services. Communication is a closely related but somewhat broader concept: communication literally means sharing of information; communication involves determination of some level of effectiveness from the recipients side. To elaborate on the difference, for example one can disseminate an information product, but one does not necessarily communicate

the information to the recipients. However, all communication requires some product or other to be disseminated (even if that 'product' is personal knowledge). The distinction is not merely philosophical. There are great many ways and means by which dissemination can be affected. Some of these contribute more than others to effective communication.

The problem associated with dissemination is this: The old adage: "Make a better mousetrap and the world will beat a path to your door" is not usually true for information products and services. The work of an information consolidation unit is not completed with the making of a product or provision of a service. Active and effective dissemination, i.e., a choice of dissemination channel(s) appropriate to a given audience and with an eye toward effective communication and fruitful use must be included as an integral part of the whole unit. Otherwise, the products will, for the most part, remain on shelves and the services will be unused. Yet time and time again information systems throughout the world neglect to pay adequate attention to active and effective dissemination. The tragic aspect is that so often there is nothing intrinsically wrong with the product or service, but the culprit is the failure of, or inadequacy in dissemination. The situation is observed in developing and developed countries alike.

These points are further considered in Topic 11 on information marketing as a concept that may be of help in effective communication of information consolidation products and services.

10.2 Dissemination channels

Some of the more important channels for dissemination of information consolidation products include:

1. Interpersonal delivery: products provided personally to users either at their request or in anticipation of need

2. Group personal delivery: products delivered to a whole group of users e.g., in a meeting, demonstration

3. Strategic placement: products placed in locations frequented by users to pick on their own

4. In-house delivery: institution of distinct dissemination functions in an organization e.g., circulation, reference

5. Local depositories: cooperative arrangements with local information systems and libraries

6. Mass media: products delivered and/or announced

through mass media: newspapers and magazines, as well as through broadcasting: radio and television

7. Mail: direct and mass mailing

8. Telephone: either through 'hot lines' for mass uses or direct interpersonal contact with possibility of feedback

9. Computer networks: product delivered through computers via telecommunication networks; online searching of data bases; electronic mail; computer conferencing

10. Various combinations of channels.

Each of these is discussed below in greater detail.

1. Interpersonal delivery. The products are personally delivered to users, either at their request or in anticipation of need. To be effective, the interpersonal delivery has to involve much more than the handing out of products, e.g. more than distributing handbills on a street corner. If interpersonal delivery includes personal conversation, consultation, and feedback from users,then this is the most effective dissemination method there is. However, it is unfortunately also the most costly and time consuming method, it has to be prepared well, and it is not suited for mass dissemination. As always, it is a matter of trade-off: high effectiveness but at a high cost and bother.

2. Group personal delivery. The products are delivered to a whole group of users, as in a meeting, conference, seminar, demonstration, etc. The possibilities for personal exchanges and feedback are still there. This method also needs careful personal preparation for involvement, not only for handing out the product. It reaches more people than the interpersonal delivery, and as such it is still costly and very effective.

3. Strategic placement. The products are placed at strategic locations for users to pick them up on their own. The location can include: places of work, places of worship, specially constructed booths, stores, meeting halls, sport events, lunch counters, etc. The location has to be selected with great care and tested. Where and how products are placed does greatly affect the attention paid to a product. Even in a good location, a pile of leaflets or brochures by itself is not enough. They have to be advertised and accompanied by attention getting devices, posters, etc. Wall posters themselves can be a product put on walls in strategic locations.

4. In-house dissemination. An information consolidation unit can institute a distinct in-house dissemination function (such as circulation department). There are a number of services that can be instituted in conjunction with

BEST COPY AVAILABLE

dissemination: reference, referral, question-answering, photocopying, etc. The policies for these functions have to be carefully formulated.

5. Local depositories: This involves distribution of products through cooperative arrangements with an information system or library not directly associated with the information consolidation units, such as branch libraries, extension agents, laboratories, educational institutions, government information offices, etc. Establishing a cooperative formula is essential for success. If the cooperating agency has some clear self-interest in the product, the success of distribution is more assured. A strong case for such self-interest has to be made and explained, or the self-interest should be clearly built in the product.

6. Mass media. Local newspapers, professional journals, national magazines, and other print mass media can be very effective for mass dissemination, particularly at the awareness stage. However, the products have to be specifically modified to fit the requirements of the mass media, usually in terms of length, narrative style, etc. Advertising through mass media should also be considered as a dissemination channel. In a different way, wall posters are also a mass media of proven success. So are photonovels. Thus, in addition to newspapers, other print mass media should be considered.

7. Broadcasting. Radio and television are another dissemination media of enormous potential and proven success. Radio, in particular, has penetrated even the remotest and poorest parts of most developing countries and television is in common use in urban centers, even in the slums. Two way radio has been successfully used for classroom instruction where distances are too great for school attendance. Specially devised radio shows dispensing useful work, crop, husbandry and other agricultural information have proven to be very popular among farmers all over the globe. Instructional and training show-how TV shows have also been very well received wherever shown. However, the broadcasting media have been relatively neglected in information consolidation, despite their potential.

Exploitation of broadcasting media should receive a high priority when considering dissemination channels for information consolidation. Radio and TV shows or just scripts can be prepared for wide distribution to broadcasting stations. An information consolidation unit doesn't have to go into broadcasting or show business to disseminate through broadcasting: scripts will suffice.

8. Mail. Mailing of products through postal facilities is another popular and effective channel for dissemination (predicated, of course, on the proper functioning of mail services). However, great attention has to be paid to establishing proper mailing lists. Mass mailings to addresses

such as "Occupant" or to institutions at large and not persons in institutions are ineffective: they ar likely to be tossed away, or they will not reach the proper person. Establishing and keeping a proper mailing list up to date is often a difficult proposition, however, it is also crucial because a proper mailing list will ensure that a product gets into the hands of the appropriate individuals.

9. Telephone. Information can be very effectively disseminated over the phone, because it has an element of interpersonal contact and allows for instant feedback. (Provided, of course, that there are accessible phones to users and the phone network functions without great difficulties). Telephone 'hot-lines' can be established. Or for mass use, pre-recorded information is played back upon dialing a number. In a number of urban medical centers the phone health lines have proven to be very popular and highly used. Cassettes on a relatively large number of health topics have been recorded by physicians; these topics include those for which most often physician's advice has been sought and questions asked, including many touchy medical subjects about which people are reluctant to ask information. Lists of available topics are widely distributed, including through newspaper ads. People call the number, a person answers and engages a cassette player with the requested topic. The popularity of the service is in the protection of anonymity and privacy of callers and in low costs: that of a phone call.

10. Computer networks. Disseminating information from or through a comptuer via telecommunication networks has also proven very effective. (Naturally, a prerequisite is the existence of and access to a computer network; many such networks exist in developed countries, and some have been initiated in developing countries, e.g. Mexico, Indonesia and Brazil). This includes, in addition to online searching of data bases, computer conferencing and electronic mail. Their potential, where existing, for dissemination of consolidated information is great.

Teaching Suggestions

Dissemination is treated together with marketing in the Handbook [6], Chapter 12, pp. 239-260.

A good review of various dissemination processes is provided in the book by J. Rowley and C. Turner Dissemination of Information [22].

A possible assignment is for participants to take a few different products as examples and design several dissemination methods for them. If this could be coupled within a realistic framework, (that is with taking real products and asking participants to design and undertake real dissemination), the

exercise would increase in value.

At this point in the course, the instructor may wish to go over all processes covered and show the interrelation among various processes in the sequence of making a given product. In addition, one can discuss how decisions on one process affects the others.

Furthermore, this particular process can again be linked with findings from user studies and with feedback from users.

Topic 10 can be covered in two lectures, the first to deal with dissemination concepts and channels, and the second one to be used for a summary of interrelations among all processes and a workshop type discussion of the assignments.

Chapter II-11

ELEVENTH TOPIC: MARKETING OF INFORMATION

Instructional Objectives and Rationale

The objectives of the eleventh topic are to:

1. Provide a definition of concepts involved in marketing and link marketing to benefits as discussed in Topic 3.
2. Describe the aggregate of activities present in marketing.
3. Explore the problems in applying marketing concepts in information systems.

Marketing is introduced to provide both the management of information consolidation units and the information professionals with a set of concepts that can be used to unify activities and strategic planning in information consolidation. It is entirely feasible to present a set of marketing principles at the outset of the course rather than here toward the end. However, within this course structure marketing was put together with the next topic on management to emphasize marketing as a crucial management activity.

Outline of Topic 11

11.1 What is marketing?
Definition of marketing. Treating information marketing as a process where benefits are exchanged -- listing such benefits. Distinction between marketing and selling. Treating promotion as only one activity in marketing.

11.2 Activities in marketing
Client (user) orientation as central concept in marketing. Activities involved in "marketing mix": market research; product development; communication; economics and pricing; dissemination.

11.3 Problems in information marketing
Lack of attention to marketing of information due to issues related to: education of information professionals, uneasy attitude toward marketing, and philosophical opposition.

Narrative of Important Points in Topic 11

11.1 What is marketing?

Marketing of information is an aggregate of activities directed at satsifying human information needs and wants through exchange processes; marketing involves viewing the whole information service or product from the point of view of final results i.e. from the use and user points of view.

Marketing of information involves exchange of benefits; the users are receiving benefits as enumerated in topic 3 and in Table 1; the information consolidation unit receives the benefits of user support, justification, and financial support.

Marketing is a well developed activity, widely accepted particularly in the business and manufacturing worlds. Marketing has achieved academic respectability: in many countries there are marketing courses and departments of study. Marketing has spread to the nonprofit and public sectors as well: educational institutions, government programs, museums, and even libraries and information systems. Marketing concepts have been very successfully applied to the development of a marketing philosophy and specific approaches relevant to nonprofit and public organizations [23]. Even though the marketing of information products and services is relatively new and is not yet widespread, general concepts of marketing are valid in this area.

Marketing is not selling. Selling is for example, having an automobile and trying to find a buyer. Marketing is looking at for example at transportation needs or wants of a population and devising and offering a solution, be it an automobile, mass transport, bicycle, or plane. One sells automobiles and markets transportation. One sells or offers a pamphlet (i.e. information product) on solar rice drying and markets a solution that will increase productivity and lower the cost of getting the rice ready as a cash crop. One sells books, pamphlets, indexes, but markets solutions to problems and benefits in the using of information, as enumerated in Table 2. The difference is crucial.

Marketing is an aggregate of many activities as described below. Promotion is just one of them. Marketing is much more than promotion or advertising. Producing a glossy pamphlet about an information product or service, advertising it, talking about it ... all could and should be a part of marketing. But, it is a misconception to equate any promotion or even an elaborate promotion campaign by itself as marketing. Unfortunately, quite often in information work behind a statement: "We are marketing our information products and services" stands nothing more than a brochure highlighting what's offered. If there is nothing more, that's not marketing; i.e. promotion by itself is not marketing. This distinction is

as crucial as the one between selling and marketing.

11.2 Activities in marketing

The central concept in marketing is in being client (user, customer) oriented rather than product oriented. The contemporary approach to marketing is simple to learn:

1. Identify your intended group of clients (users).

2. Find out all you can about their needs and wants. (e.g. apply user studies as treated in topic 4)

3. Try to satisfy them with the right products or services, supported by the right communication about the products, their benefits and uses, and available at the right time and location. (e.g. as discussed in topic 3, and topics 6 to 10)

Marketing involves these activities referred to in the trade as 'marketing mix':

1. Marketing research - analysis of clientele (user groups), identification of characteristics, needs, wants, similarities, constraints, economics (as treated in topic 4).

2. Product - development of a product or service in congruance with the findings of market research; targeting; testing of products; consideration of alternative products; adaptation if necessary (as treated in topics 6 to 8).

3. Communication - information to users about benefits, usage, uses; user education; promotion (as treated in topic 3).

4. Economics - determination of cost factors; pricing decisions (even a free service to users is a pricing decision), analysis of economic factors, e.g., cost benefits (as treated in topic 12).

5. Dissemination - delivery of product or service in an effective way, and at the right time and place (as treated in topic 10).

All these marketing concepts should be present in information consolidation. Using these modern marketing concepts, an alert information manager designs the structure of his/her system to give the marketing components their deserved prominence. The marketing function should be fully integrated with other processes of the system.

11.3 Problems in information marketing

Yet despite the evident importance of active dissemination (as enumerated in topic 10) and of information marketing, information systems pay little and inadequate attention to these important functions. Why? What are the problems? Three issues may be discerned:

First, the tradition and education of information specialists and librarians. Active dissemination and marketing was not, and, still is not, cultivated as an integral part of the profession and its education. The traditional assumption, still prevalent today, is that the users will find the way to an information systems' door by themselves, if the system in question offers a good product, collection or service. Some users indeed will, but most won't. To reiterate: many information professionals believe that any product or service properly designed to meet a need and professionally implemented will enjoy widespread utilization. However, in practice, such an assumption or belief has to be supplemented. Typically, widespread utilization occurs only when an additional, conscious and deliberate effort is made to market the serice or product and make potential users aware of its services and benefits.

Second, an uneasy attitude found among information professionals toward active dissemination and marketing. This attitude can be paraphrased as: "There is something vaguely unethical about marketing of information and if not unethical then at least distasteful." Unethical? No. Marketing is not to be equated with pushiness and high pressure selling of products or services, some of them rather shabby--this is a total misunderstanding of what marketing is all about. If anything, marketing is the reverse of the selling concept. Distasteful? Possibly, but only in so far as any complex problem and hard work may be distasteful. These attitudes are not only wrong, but also harmful for both a service and its users.

Third, there is at times a philosophical opposition to active dissemination and especially marketing on the ground that they introduce an element of commercialization in information work. The argument is that commercial aspects (which involve consideration of markets, costs, prices, value received, exchange, etc.) have a distorting effect on information products and services which should be appreciated on their own intrinsic merit. Marketing certainly does involve considerations of costs and economics in relation to both information systems and users and, in that sense, it involves commercial aspects, but not to the exclusion of all others. In cases where, as a matter of policy, information systems are fully and continuously subsidized without necessity for any accounting regarding costs, cost-effectiveness, and cost- and user-benefits this philosophy is in place and it should not be argued with. Where such policy is not in effect, absence of market consideration is harmful and

this philosophy is out of place. So, it is not a question of philosophy at all, but a question of the type of policies in support of a given information systems in general and information consolidation units in particular. An information system can afford the luxury of not worrying about the market and connected economic/commerical aspects if and only if it is fully subsidized without questions asked. There certainly is a place for such systems. The Alexandrian library is a splendid example of this sort of thing. But an overwhelming majority of information consolidation units are not supported in such a way.

To put it bluntly, an information consolidation unit without active dissemination and marketing integrated with products and services offered will inevitably fail.

Teaching Suggestions

Marketing is covered in some detail in the Handbook [6], Chapter 12, pp. 239-260. Particularly the marketing activities treated in topic 11.2 are described in some detail.

An additional reading is the excellent book by Kotler [23]. Kotler deals with marketing of non-profit organizations in general, that is, with a larger array of organizations than information consolidation units or information centers. However, his descriptions, examples, and justifications are valid for information marketing.

Two further books may be of use in this topic:

* Cronin, B. ed. The Marketing of Library and Information Services [24], a reader published by ASLIB.

* Yates, B. ed. Marketing of Information Services [25], a set of papers from a Unesco regional workshop held in Australia.

A possible assignment for participants is to plan an entire marketing strategy for information consolidation products that they have developed in previous assignments or that were used as examples. Another possibility is to divide the class into groups, each dealing with one marketing activity as enumerated and then integrating their suggestions within a large workshop session on marketing strategy. Again, findings from user studies can serve as fitting results of market research.

Marketing can be covered in two lectures and a workshop session. The first lecture can deal with topic 11.1 on marketing concepts and start with topic 11.2 on marketing activities. The second lecture can complete topic 11.2 and include discussion of marketing problems (topic 11.3). The workshop can be devoted to discussion and/or conduct of assignments as suggested above.

TWELFTH TOPIC: MANAGEMENT OF AN INFORMATION CONSOLIDATION UNIT

Instructional Objectives and Rationale

The objectives of the twelfth topic are to:

1. Define management activities and list functions involved in management of information consolidation units.

2. Elaborate on financing as a most sensitive aspect and enumerate financing requirements, and discuss possible locations of an information consolidation unit.

3. Discuss staffing and the staff requirements in terms of expertise, retention and training.

4. Present requirements involved in various stages in evolution of an information consolidation unit.

The management of an information consolidation unit is treated here at some length and depth because good management is absolutely essential for the success of a unit. Participants ought to be impressed with the complexity and importance of management. It is realized that it is impossible to discuss here specific management requirement of given units in given environments, thus only general requirements are presented here. However, this does not preclude use of specific examples within the student's environment.

Outline of Topic 12

12.1 Elements in management of an information consolidation unit
Definition of management. Management principles common to all units. Enumeration of management functions including, setting of objectives, policy formulation, planning, resource allocation, budgeting, staffing, control, evaluation, representation and communication.

12.2 Financing and location
Treatment of financing as a most sensitive aspect of information consolidation. Planning costs, launching costs and operating costs. Financial consideration in pricing and expenditure controls. Possible locations for an information consolidation unit.

12.3 Staffing and subject expertise
Size of the unit and staffing requirements. Role of subject expertise. Requirements for attracting and keeping competent personnel. Staff training.

12.4 Life cycles of an information consolidation unit

Human organizations as living systems. Requirements for different phases of a unit: preplanning or idea phase; planning phase; launching phase; operational and expansion phase; self sufficiency; possible discontinuance.

Narrative of Important Points in Topic 12

12.1 Elements in management of an information consolidation unit

While different organizations have different organizational structures in the management and administration of their activities, some general management principles are (or ought to be) common to all.

Management is the process by which decisions are made and carried out within an organization. Management is concerned with judicious use of means and resources to achieve organizational objectives. In a more specific way management can be defined as the guiding of human, physical and economic resources into dynamic organization units that attain their objectives to the satisfaction of those served, and with a high degree of morale and sense of attainment on the part of those rendering the service.

Management of an information consolidation unit includes the following functions:

1. Selection and elucidation of objectives. Setting of priorities. (These may be set by the management of parent organization.)
2. Strategic planning and specification of marketing strategies. Forecasting.
3. Operational planning and task programming involving all activities, products, services.
4. Formulation of policies for activities of the unit.
5. Staffing, including selection, training and administration of personnel.
6. Budget formulation. Budget justification.
7. Ensuring resources for achieving plans.
8. Allocation of resources.
9. Control of staff and use of resources.
10. Periodic evaluation of all aspects in the unit.
11. Justification and representation of the unit.
12. Communication within the unit, with clients, and with higher management.

Different organizations may stress different aspects of these management activities, but in one form or another all of them are present either through involvement of the immediate management of the unit or through higher management levels of the parent organization.

Hardly any information consolidation unit can be expected to operate on its own. Most, if not all are located within a larger, parent organization. Clearly, the larger objectives and framework of parent organization define the objectives, role, financing, staffing and operations of the unit. Thus, any and all management functions of the unit are dependent on the management of the parent organization. This relates most directly to financing as discussed next.

12.2 Financing and location

Financing is the most critical and vulnerable aspect of information consolidation units any place. Information consolidation is a costly proposition which requires adequate and sustained financing. While it is impossible to deal here with specific financial requirements for a unit, the general cost factors and financial requirements are for:

1. Planning Costs:
   * feasibility studies
   * user studies - marketing research and analysis
   * design

2. Launching Costs:
   * development of functions, products, and services
   * deployment and testing
   * development of market and marketing
   * investment in facilities, tools and equipment
   * staffing and staff training and education

3. Operating Costs:
   * salaries for a director, professionals and supporting staff
   * fees for consulting subject experts, if employed on periodic basis
   * cost of procurement or access to necessary information sources
   * expenses incurred in given functions
   * marketing expenses
   * continuing education expenses for staff

Financial outlays to cover all of these expenses can be considerable. It is not unusual then to seek and establish composite funding.

For the planning and launching costs, financial assistance from national and international organizations (outside of direct sponsoring or host institution) is indispensable. Such assistance is necessary for a period for one to three years. A good proposal is required to secure the assistance, which in turn requires considerable and careful preliminary work. A good proposal shows the need, justifies the approach taken, describe methods, and demonstrates competence for carrying out the tasks.

For the operating costs, the unit has to rely on financial support from the sponsoring or parent institution. In some instances, this support amounts to a full subsidy. However, in many other instances, after about 3-4 years from launching, cost-recovery programs have to be instituted in order to recover costs in part or even in full. The unit may have to become nearly self-supporting. In those cases, careful consideration has to be given to:

* pricing policies and price elasticity

* spreading the operating costs over a sufficiently large number of users, so that economy of scale may be working (low fees over large numbers = adequate revenues)

* strictly controlling and minimizing internal expenditures and maximizing the efficiency of operations

* pooling of resources with other information systems; establishing of resource - and operation-sharing.

Financial problems require realistic planning, such as starting at (i) a modest level with (ii) cautious and judicious function and product development, (iii) immediate stress of marketing, and (iv) involvement of subject experts from parent institution at low or deferred cost to provide help in product development.

Financing brings the obvious question:

> Where should an information consolidation unit be located?

The answer can be discussed here only in a general sense - specific decisions depend on specific circumstances in given environments.

Any information consolidation unit requires a direct or indirect working relation with an organization that coincides with the subject or mission of the unit. The unit has to have help in terms of subject expertise, as well as financing. Over the years experience has shown that the most fruitful connections are with:

* a research institute on a subject (such as at the Tata Energy Research Institute in India from which come many examples used here [7 to 11])

* an academic and research organization with strong subject background and information resources (such as at the Asian Institute of Technology in Thailand, described in [13])

* an agricultural research institute and network connected

with extension services (such as at the International Center for Tropical Agriculture in Colombia, described with a number of other centers in [26])

* an institute or international organization pertaining to a single crop (such as at the Rubber Research Institute in Malaysia [26])

In each of these cases there was most successful integration between the information consolidation unit (often called in those examples - information analysis centers) and the parent organization. The clear sense of mission, the subject expertise, and financial backing offered by parent institutions were absolutely crucial in the considerable success of associated information analysis centers.

In a broader context, information consolidation can be associated with extension services such as found in many countries in agriculture, or with public health units. Providing information is the main function of extension services and public health units. In turn, information consolidation units can substantially contribute to this function.

12.3 Staffing and subject expertise

Many information consolidation units are small, some are even operated by only one person. The staffing requirements mentioned below may have to be concentrated in one or few persons. Thus, these requirements may have to be translated into required expertise rather than treated as a required number of persons. Staffing requirements are:

* a director having management and representational capabilities, and a visionary outlook

* professional(s) with information expertise

* professional(s) with subject expertise (internal or external consultants or collaborators)

* supporting technical personnel as needed for given technical jobs.

A crucial aspect is to have access to people which have expertise in the subject(s) or missions reflected in the products of the information consolidation units. The requirement is not to have necessarily both, the information professionals and subject experts within a unit, but to have access to subject experts as needed. That is quite often a tough requirement, because of time pressures on the subject experts. Thus, the requirement is to make every possible effort to use subject experts effectively, save their time as much as possible, and make their collaboration as easy as possible for

them. This underscores the importance of effective relations with the parent organization.

However, reliance on outside and part-time collaboration can go only so far. No unit can operate on part-time staff alone. Full-time professional staff is a necessary requirement, how many depends on the size of the effort. It is better to have information professionals as full-time, and subject experts as part-time staff, than vice versa. The best choice is, of course, to have both full-time, but that is difficult to achieve in most instances.

These are the minimum requirements for attracting and keeping permanent, competent information staff:

* adequate compensation, comparative to compensation given to other professionals in the organization
* job status (e.g. civil service scale) equal to other professionals
* benefits equal to other professionals
* opportunities for training and further professional development
* working conditions under which professionals can exercise their competence, comparable to working conditions of other professionals.

Staff training is a necessity. However, such training requires a continuous program of professional development. This can take many forms: institution of in-house courses and lectures; sending people to outside courses, meetings, conferences, lectures; cooperation with professional associations or academic institutions in starting and carrying out continuing education courses; subscriptions to professional literature and periodic discussions of readings, etc.

12.4 Life cycles of an information consolidation unit

Human organizations are living systems. In that sense, an information consolidation unit can be considered in relation to the phases or stages in the cycle of its life: from inception, to birth to adolescence, to adulthood and possibly to death. Each life phase has different requirements as discussed below. Adaptation of these requirements are made from Valls [13].

1. Preplanning or idea phase (inception). Covers the period from the time that someone has the idea for establishing the unit until a proposal for assistance is sent to a national or international organization. Requires:

* detection of a need and problem: that it actually exists and that it is not just an assumption
* definition of a subject or topic to be covered
* definition of types of users to be served
* determination of the size of the effort
* outline of the methods and approaches to be used
* drafting of a pre-proposal and testing the ideas with as many people as possible
* securing the backing of a host organization for the future unit
* searching for a funder for assistance, conferring with that organization, adjusting the proposal to requirements of the funder.

2. Planning phase (incubation). This covers the period from the time proposal is accepted to the time a unit is physically launched. It requires:

* recruiting and training professional staff
* securing a location and facilities of easy access for experts and users
* securing expert consultation
* dealing with the management aspects, including lines of authority and responsibility
* conducting a user study and market analysis
* establishing an advisory board and using it
* drawing up a full definition of choice of subject or topic covered and of the size of the effort
* getting the necessary tools and equipment
* designing processes, products, services, and preparing specifications for associated evaluative criteria and working procedures
* planning of marketing, including evaluation of products and services
* testing and adjustments
* establishing connections with other information systems.

3. Launching phase (birth). Includes the period extending from the announcement of the services until the time when the users start reacting. Requires:

* effort to create a wide awareness of the units existence and of the potential benefits to be derived from using its products and services
* promotion, user education, travels, visits, demonstrations, etc; in order to achieve high visibility and open lines of communication
* launching all operations and producing first products and services
* immediate positive (non-defensive) reaction to any questions, complaints, criticisms
* strengthening connections with experts
* continuing staff training with adjustments as necessary
* reporting to funder

* showing results to sponsoring organization.

4. Adjustment or first operational phase (infancy). Covers the period extending from the first user reaction to the provision of products and services and to the satisfactory execution of routine operations. Requires:

* evaluation of user and market reactions
* shake-down of all operations, and adjustments as necessary, reassignment of staff
* increased attention to quality control in all operations, products and services
* creating trust and confidence in users
* strengthening connections with other information systems: routine conduct of exchanges and resource - and operation - sharing
* expansion of marketing
* consideration and development of new products
* showing results to professional colleagues
* showing benefits to sponsoring organization.

5. Expansion or second operational phase (adolescence). Covers the period extending from the attainment of full operations status to the achievement of a relatively high growth rate. Requires:

* continuing evaluation and reevaluation and initiation of necessary changes
* shifting attention from routine operations to continuing and intensified marketing and recurring contacts with increased numbers of users
* increased attention to efficiency of operations,sd minimizing costs and maximizing performance
* launching of new products and services
* opening avenues to new users (late adopters and laggards)
* preparing cost-recovery programs
* reexamination (and if necessary readjustment) of relations with subject experts; seeking of new groups of experts on a rotational basis
* rotation of advisory board.

6. Self-sufficiency or third operational phase (maturity). Covers the period from achieving relatively full market potential (high growth rate) to the battle for continuous existence and survival, and to relative lower growth rate or even steady state. Requires:

* continuing evaluation, reevaluation and adjustment to environmental conditions and changing user needs
* achieving financial cost-recovery programs as planned, adjustments as necessary
* launching new products and services; improvement of old ones; mandatory abandonment of less useful products
* increasingly cultivating user contacts and trust; leaving

nothing to routine with users
* new training and professional development efforts for new staff; continuing education for all staff
* continuing marketing, but with new marketing approaches.

7. Possible discontinuance (death): an information consolidation unit can be terminated of its own accord because of inadequate budgets, performance, and/or internal failures, however, there are cases when the unit is closed because of other objective reasons such as:

* sponsoring or host organization changed interests as to subject or topic and the information is no longer needed
* the pace of the activity in a technical area of information coverage slackens i.e. there is no information to consolidate
* the information became available within reach of the user community on its own
* the urgency of information needs has gone.

Teaching Suggestions

The topic of management is treated in the Handbook [6] Chapter 13, pp. 261-284. Valls [13] treats establishment of a specialized information analysis center in chapter 3, pp. 72-78. Unesco has issued a report by Seetharama [12] which provides at some length guidelines for establishment of information consolidation units. All these present suitable readings. The examples cited are from [7-11, 13 and 26].

The book by Webb, S.P. Creating an Information Service [27] provides a good general background reading on the subject, particularly since the emphasis is on simplicity and efficiency, particularly in relation to setting up and managing a small information service.

The book by Roberts, S.A. Costing and the Economics of Library and Information Services [28] is a compilation of articles dealing with a variety of economic aspects and addresses aprroaches to cost studies.

At this time it may be advisable to invite outside speakers who are managers of an information consolidation unit or an information analysis center to provide a picture of management concerns in 'real life.'

A possible assignment for participants is to outline some of the management functions (e.g. planning, staffing, budgeting) at some length and link them to the products which were presented or designed during previous topics.

Management topic can be presented in three lectures: first to cover management concepts (topic 12.1), second, financing,

location and staffing (topics 12.2 and 12.3) and third, life cycles of an information consolidation unit (topic 12.4). A fourth lecture could be the suggested visit by a manager.

Chapter II-13

THIRTEENTH TOPIC: SUMMARY OF REQUIREMENTS AND PERSPECTIVE FOR INFORMATION CONSOLIDATION IN A GIVEN ENVIRONMENT

Instructional Objectives and Rationale

The objective for this last and thirteenth topic are to:

1. Summarize the course by summarizing the requirements involved in all processes in information consolidation.

2. Provide an opportunity to discuss specific perspectives for information consolidation in the environment of the participants.

3. Provide a general concluding perspective on the course and on information consolidation.

The final session or sessions of any course are usually devoted to review, summary, and projections. The last topic in this course is no exception. The topic has two distinct parts: one general and one specific. The general part is used for summary of requirements of information consolidation processes and for concluding remarks. The specific part is used for an opportunity to provide a review of specific prospects for information consolidation in the environment of the participants. This specific part implies that the instructor will supply the content for such a perspective.

Outline of Topic 13

13.1 Summary of requirements in information consolidation processes
Requirements involving: selection, acquisition, evaluation, analysis, synthesis, restructuring, packaging, dissemination, marketing, and choice of products.

13.2 Perspective for information consolidation in given environment
Specific perspective and problems involved in the environment of the participants. Local, national, regional, and international picture and forecasts.

13.3 Concluding perspective
Summary of the aim of the course. Complexity of information consolidation vs. benefits for users.

Narrative of Important Points in Topic 13

13.1 Summary of requirements in information consolidation processes

The basic processes in most, if not all, information consolidation units are: selection, acquisition, evaluation, analysis and synthesis of information with a view to the provision of a product or service, and their dissemination and marketing. The requirements for these are summarized below:

1. Selection requires:
   * a selection policy (involving statement about users and needs; subject, topic, or mission to be dealt with and type of information sources and materials to be covered)
   * selection aids and tools which will guide in selection and help verification
   * specification of a selection process (involving decisions on who selects; procedures for judging intrinsic values of information in sources; and procedures for judging demand and user appropriateness)

2. Acquisition requires:
   * procedures for procurement of necessary information sources
   * in cases of no outright procurement: procedures for access to sources e.g. getting on loan, photocopying pertinent sections, getting permission to use them in another information systems, etc.

3. Evaluation requires:
   * criteria for assessing the quality or intrinsic merit of information (validity, reliability, accuracy, credibility, significance, etc.)
   * criteria for assessing the information products and services from user point-of-view
   * procedures for achieving a consensus in assessments.

4. Analysis requires:
   * specification of the topics in relation to which information will be analyzed
   * a classification scheme or a table-of-contents of the topic for organization and systematization of analyzed information
   * specification of procedures for extraction of the most relevant and salient information or data
   * assessment and verification of the extracted information or data by evaluation criteria described above
   * sorting of extracted information into given classes or headings.

5. Synthesis requires:
   * comparative arrangement and evaluation of extracted information
   * derivation of a consensus and resolution of possible conflicting information
   * compression or merger of information into a structure and form most suited for intended users and uses
   * evaluation of the final product.

6. Restructuring of synthesized information requires determination of the mode in which the contents of information consolidation products will be presented to users in a way that is most compatible with the situation and needs and that will enhance the comprehension and assimilation of information presented. More specifically, restructuring requires determination of:

   * extent to which available content is to be incorporated
   * degree of invariability of information as found in the original (i.e., whether new information value is to be added)
   * degree of detail in information
   * degree of changes in sequence of presentation relative to the original
   * technical sophistication
   * temporal presentation
   * editorial qualities

In restructuring, principles of effective technical writing and scaling to audience have to be followed.

7. Packaging and repackaging requires determination of a medium and format in which an information consolidation product will be presented to enhance its potential use, comprehension, assimilation, and recall. Media choices for packaging are:

   * print media: print-hard copy and print-microimages
   * audiovisual media: visual media-still images; visual media-moving images; audio media; and any combination of the three
   * electronic media
   * interpersonal contact

In packaging formats the requirement of effective formatting should be followed in terms of:

   * readability (comprehension where reading is involved)
   * viewability (comprehension where viewing is involved)
   * audibility (comprehension where listening is involved)
   * identifiability (cognition and perception of key information elements)
   * mnemonics (visual or audio association, particularly for recall)

8. Dissemination requires determination of the channels by which information products will be delivered into the hands of users. (Often packaging and dissemination may be combined). The choice of channels is among:

* interpersonal delivery
* group personal delivery
* strategic placement
* in-house dissemination
* mail
* local depository
* newspapers
* broadcasting; radio and TV
* telephone
* computer networks.

9. Marketing requires determination and integration or procedures for:

* market research and analysis
* segmentation of users into groups with similar characteristics, values, needs, and information benefits.
* development and targeting of information consolidation products to given user segments
* user education
* promotion
* evaluation.

10. Choice of products: possible information consolidation products include:

* new announcements, newsletters
* pamphlets, brochures, question-answer sheets
* monographs, technical reports
* critical reviews, state-of-the-art reports, and handbooks
* technical guides and "how-to" booklets
* operational or maintenance manuals; specifications; standards
* recurring summaries of advances in a topic; short textbooks
* market reports; industry reports
* statistical condensates, cross-tabulations, or correlations
* briefings
* radio or TV scripts or shows
* comic strips, photonovels
* wall posters
* lectures, tutorials
* demonstrations, exhibitions
* question-answer sessions
* information 'hotline'
* prerecorded telephone messages
* referral (with assessments of the referred organization)
* video newsletter

* audiovisual presentations (packages)
* videotapes, videodiscs for training
* computer online searching and manipulation of output
* viewtext screens, teletexts

13.2 Perspective for information consolidation in given environment

Since the perspective depends on the given environment of the participants the instructor will have to choose the examples and provide a specific perspective and narrative.

13.3 Concluding perspective

The aims of this course are to contribute to the clarification of concepts, problems, and requirements of specific practices referred to as information consolidation and to create competencies in information consolidation processes. In turn, the aim of information consolidation efforts is to increase the effectiveness of information usage and to widen the circle of the population of users served.

As mentioned at the outset, information consolidation is neither an information panacea, nor a substitute for any of the existing information activities. It is one approach in the whole spectrum of information practices needed for various aspects of development.

However, information consolidation is an effective approach to fulfillment of specific informational needs for evaluative and synthesized information services for the yet unserved. Information consolidation of one type is applicable to highly sophisticated users--engineers, scientists, managers, policy makers--and of another type to users of lesser sophistication --workers, villagers, and school children. The choices are wide.

It should be stressed in conclusion, as it has been throughout the course that the information consolidation provides a great opportunity for using non-print dissemination channels and packaging media (radio, TV, etc.), particularly in relation to information for a broad audience in both, the urban and rural areas.

Information consolidation is complex and demands a definite commitment of resources. However, information consolidation has proven its value and benefits in information transfer. Therefore, information consolidation should be given a high consideration in the institution or refinement of information efforts serving developing countries.

The secret of information consolidation is this:

While information consolidation involves complexity in processes, it offers simplicity and appropriateness in products. The potential benefits derived in using consolidated information are high.

Information consolidation is possibly the most effective tool for transferring appropriate technology to developing countries and also a most effective means for ensuring use of information.

Teaching Suggestions

The Handbook [6] provides a summary of requirements for information consolidation processes in Chapter 13, pp. 261-284. The same Handbook also includes a set of examples of information analysis centers and their products in Appendix 1, pp. 285-314. Other information analysis centers and their products are described in [20 and 26].

A possible assignment is to require a report summarizing specific processes in an information consolidation unit either described by the instructor or choosen individually by each participant. Alternatively such an assignment can be given in the form of an essay question on an exam.

The topic can be presented in three lectures, the first dealing with the summary of processes (topic 13.1) and the second, with the perspective (topic 13.2). The third lecture should really be a workshop session to review and evaluate the course with participants and obtain their feedback for future improvements and to make the concluding remarks (topic 13.3).

PART III IMPLEMENTATION

Chapter III-1

ORGANIZATION AND PRESENTATION OF THE COURSE

As mentioned in the Preface, the course is designed for two frameworks:

1. to be incorporated as a regular course in a library and information science curriculum and/or

2. to be adopted as a continuing education course for practicing information professionals within a continuing education program of an organization.

Consequently, a separate discussion is provided below on the organization and presentation of the course within each of these two distinct frameworks.

Library and Information Science Curriculum

The course is most ideally suited for teaching within an established curriculum in library and information science either on an undergraduate (bachelor) or graduate (masters) level. Necessary adjustments for different degree levels (particularly in the depth of treatment of given topics) should be made. It is recommended that on the undergraduate level the course be offered in the senior year i.e. toward the end of studies, and on the graduate level in the middle of or toward the end of studies.

As designed, the course is envisioned as a single course presented over a period of one four month semester i.e. approximately 30 to 35 class periods. However, it would be easy to enlarge the offerings in information consolidation with further and more advanced courses by elaborating on one or more of the following areas:

1. The study of environment and users (topics 1 to 4)

2. Methods for creation and dissemination of information consolidation products (topics 5 to 10); or

3. Management of information consolidation units (topics 11 and 12).

The course is related to the following areas (or courses) usually found in library and information science curricula:

...information representation (bibliographic control, classification, indexing, abstracting)

...user studies and research methods

...special libraries and information centers; information analysis

...searching of data bases; reference; user services

...information sources and services in various subjects (e.g. science and technology, health, business, agriculture, industry).

It is advisable that the course on information consolidation be integrated with the program of study incorporating one or more of these areas, i.e. be a part of an existing sequence of courses, rather than an appendage without ties to the existing program(s) of study.

According to their specific needs, different institutions may choose to emphasize different topics of the course and/or provide specific user orientation. If made, a particular choice of emphasis will provide a clue for specific connections with other parts of the curriculum. For instance, a choice of emphasis on information consolidation toward science and technology should dictate a connection with courses on information sources in science and technology and on special libraries and information centers. However, the course can be presented without an emphasis on any particular subject application.

Continuing Education

The course can also be adopted by various institutions (professional associations, national or sectoral information systems, government agencies, universities) to become part of their program of continuing education. Usually, such continuing education programs are oriented toward already practicing information professionals or toward professionals in other fields entering into information services. As designed, the course can serve continuing education needs, however, some adaptation will be necessary. In particular, this means adaptation to the specific subject(s) and levels of information consolidation (e.g. if health information consolidation is involved, clearly the discussion of specific health environment should be used.)

The presentation of the material in toto as outlined in this syllabus within a continuing education framework would require about the same amount of class periods as in an academic program i.e. approximately 30-35 class periods. This could be given highly concentrated in a period of a week or it could be spread over a much longer period of time given once a week, or once every two weeks.

Furthermore, different topics from the syllabus could be

singled out for individual presentations, and adapted for presentation over much shorter periods of time. Such presentations should be aimed toward a creation of an awareness of the existence of information consolidation, rather than teaching of competencies. In other words, popular lectures about information consolidation can be given based on summary of several topics.

Instructors: Preparation and Teaching

The key to success of any course is the instructor and this course is no exception. It is realized that instructors in library and information science programs or recruited for continuing education offerings may not be readily prepared to teach information consolidation - this is not a widely taught academic subject. For this reason the narratives of the topic are quite detailed. They provide instructors with enough materials to outline each lecture. With further readings as suggested for each topic the instructor can fully prepare for teaching.

Visits to information analysis centers, discussion with their personnel, and analysis of their materials can also greatly help in preparation for the course. It will certainly add a real-life practical component to the course. In addition, the instructor can write to similar units and centers in the region or even worldwide and request materials to be used in teaching. A list of addresses of such centers can be found in Appendix to this Handbook, as well as in: the Handbook [6], Appendix I pp. 285-315; report from a meeting organized by Canada's International Development Research Center [26] and in many directories, such as [20].

Guest lectures on given specialized topics, such as management, will greatly enhance the conduct of the course.

The narrative of the topics have a large number of enumerations (e.g. on characteristics or types of the item under consideration). Several figures and tables are presented as well. These are ready made for use as transparencies, slides, or handouts. Enumerations such as these help greatly, both in teaching and learning.

Teaching of a course like this can be very rewarding. It presents a whole cycle from generation to use of information products and provides for a strong user orientation with which the participants can easily identify. It also includes very practical discussions and exercises which provide for close involvement of participants in conduct of the course.

User orientation is the hallmark of information consolidation and participants involvement should be the hallmark of this course.

Chapter III-2

COURSE EVALUATION

Evaluation of educational offerings can be a most powerful tool available to educators in their capacities as teachers or administrators. Information derived from reliable appraisals of educational efforts is essential to educators in order to improve future efforts and rationalize and justify decisions both in the past and in the future. Thus every educational offering should as a rule include an evaluation as an essential element of the program.

In recognizing importance of evaluation, Unesco has published a report:

> Lancaster, F.W. Guidelines For the Evaluation of Training Courses, Workshops and Seminars [29]

Lancaster's report provides a detailed description of evaluation levels and procedures and includes numerous evaluation forms, some of which can be readily adapted for use in this course. The appendices provide questionnaires used in continuing education courses. The report is of great relevance to any and all educational efforts and it is highly recommended for use in developing evaluation procedures in this course. The discussion that follows includes many points from that report.

Levels or Steps in Evaluation

An educational offering can be evaluated at several different levels. An obvious concern is the quality of the presentation of a course:

* were the instructors satisfied with it?
* were the students satisfied?

At another level the important question is:

* did the course impart the knowledge, skills, attitudes it was designed to impart? i.e. Did the course on information consolidation achieve its specific instructional objectives?

Moving in a different direction, some other evaluation questions emerge:

* was the overall program well designed and did the information consolidation course fit well in the program?

* was the course as designed and presented the best method for presenting the materials on information consolidation

and in creation of necessary competencies?

Four levels or steps can be readily distinguished in evaluation of a course as proposed here:

1. Evaluating reaction of participants
2. Evaluating learning acquired
3. Evaluating behavior changes
4. Evaluating course and program results

Evaluating the Reaction of Participants

Evaluation reaction of participants means obtaining some data usually in descriptive form about the subjective impressions and responses of participants: students, instructors, observers. Of all levels of evaluation this one is easiest to accomplish, however, it is also the most subjective, thus needing most caution in analysis and acceptance of results.

Evaluation may be formal or informal or both. Informal evaluation occurs at all times. An instructor may solicit feedback from participants at breaks and informal gatherings. Even if he/she does not solicit such evaluation, the participant will likely provide it gratuitously. Whether or not they are asked to do so participants will conduct their own evaluation of the course. That is, they will make their own judgments about the quality and relevance of the contents, the success of the approaches to teaching, etc. By mixing with participants, an observer may be able to obtain a fairly clear idea on how well the course is going. The instructor is likely to sense how well the course is progressing and he can evaluate himself as the course develops. Adjustments can be made as necessary.

In contrast to this informal or casual evaluation, formal evaluation implies a deliberate effort on the part of the instructor, course organizers, or program administration to get some assessment of reaction to the success of the course. A formal evaluation involves some standardized approach to data gathering, usually by the use of questionnaires. The data should be gathered in some systematic way and a consistent form. These data may also be quantified in some sense e.g. 80% of participants rated high the approach used in teaching.

The questionnaire on reaction of participants to a course on information consolidation should be worded in a way that fits the specific environment and occassion. The following general areas should be included in the questionnaires:

1. Objectives: were the course objectives clearly oulined and understood? Were they achieved?

2. Contents: were the contents new? Were they relevant to the participant's plans, work, situation?

3. Lectures: were they clear? Well organized? Was the sequence logical? Were they comprehensive? Was the level of treatment too complex, right, or too simple?

4. Materials: were the materials (readings, examples) adequate? Well integrated with lectures and assignments?

5. Assignments: were they realistic in time demand? Complement lectures? Advance learning?

6. Setting: were the facilities adequate? Time schedules appropriate?

7. Rating the overall satisfaction with the course.

8. Suggestions: list of recommendations for the future.

The responses to the questions can be recorded on a numerical rating scale e.g. on a 5-point scale ranging from high or excellent to low or poor. These can then be statistically summarized to obtain an overall picture of participants reactions.

Evaluating Learning Acquired

While the opinions of course participants can be considered a valuable feedback, much more important are more objective measures reflecting how much the participants have learned. Unfortunately, this is also more difficult than merely gauging student reaction.

Instructional objectives are described for every topic. For each of these objectives an instructor can develop an appropriate demonstration of achievement. Obviously, such demonstation can incorporate several objectives at once. These objectives can serve as a table of contents for comparing knowledge and competencies gained by participants. The questions are:

* Did the participants comprehend a particular set of concepts or master required skills in carrying out the given processes?

* Can the participants integrate the parts of the course in a unified whole and can they relate what they have learned to their other learnings and experiences?

The evaluation of learning can also proceed along informal and formal lines as discussed in the previous section. Formal evaluation can include:

1. Grading of oral presentations or direct answer to questions in the classroom.

2. Grading of assignments and written reports.

3. Tests or exams (written or oral).

In either of these the questions or areas for the discussion, assignments, reports or tests have to be clearly delineated and specified. In respect to tests as evaluative instruments the following three requirements must be satisfied:

1. Test items must be specifically related to the stated instructional objectives of the course or course topics.

2. Experts must be able to agree on what is the "correct" or "best" answer.

3. Most students who have not taken the course should not be able to respond correctly or adequately to the test items.

The requirements, frequency, methods and scores for testing are determined by the practices and policies of given institutions where the course is offered.

If this course is given as a continuing education course where participants are not required to demonstrate learning through a test or report, still provision of a test may be very helpful for participants to take home and complete on their own for selftesting.

An accumulation of questions for the course can be helpful for the learning process in general. Thus, questions could be given to participants with each topic to guide them in their studies.

Evaluating Behavior Change

If evaluation of learning is difficult, evaluation of behavioral changes in participants is even more of a problem. Behavior evaluation is concerned with long term effects of the course. This goes beyond learning as such into the application of the learning acquired. It is possible for someone to "learn" some body of knowledge (in the sense that he/she can pass a test based on memorization) but still may not be able to apply it in a practical situation.

The questions asked are:

* How did the participants benefit from the course in the long run?

* What was the impact on the participant's professional development and the extent they have applied the knowledge or competencies gained in practice?

* Have the participants been able to use materials and contents presented in the course and if so with what success?

Evaluation of behavior change implies doing the evaluation some time after the conclusion of the course. Again the evaluation could be informal or formal. Formal evaluation may involve:

1. On-the-job performance assessment using peers or superiors of those participating in the course.

2. Follow-up questionnaire to the participants or interviews with participants to fill out the questionnaire.

Here are some questions that can be asked in the follow-up questionnaire or interview after a time (e.g. six months) as taken from Lancaster [19]:

(1) What is your assessment of this course as a whole, now:
..... good
..... average, adequate
..... disappointing

(2) If this course were repeated, and a colleague asked your advice about whether it was worth attending, what would you say
..... yes, go
..... no, don't go
..... it depends (on what? Please explain breifly below)

(3) (a) Looking back on it, does anything about this course stand out as being particularly helpful to you professionally?
..... yes
..... no
(b) If "Yes" above: What is it?

(4) Have you actually used, or since put into practice, anything new you heard about at this course?
..... yes
..... no

(5) If "Yes" above: What was it - and how did you use it?

(6) If "No": Was this because:
..... you learned nothing new at the course
..... you heard about new things, but they are not appropriate to your situation, and you are not likely to use them
..... you heard about new things, but haven't had a chance to use them yet.

(7) Useful contact with other information professionals is sometimes mentioned as a side-benefit of attending courses:
(a) Did you make what seemed to be useful or interesting contacts at the time?
..... yes
..... no
(b) Have they in fact been useful to you since?
..... yes
..... no

(8) What would you now say were the main faults or defects of this course?

(9) If you were put in charge of re-planning this course, What changes would you make to remedy this?

(10) How well do you remember this course?
..... clearly, well
..... reasonably, fairly well
..... not very well

Evaluating Course and Program Results

Evaluating program results differs from the three types of evaluations in that it is oriented toward the course as a whole and its place in the overall educational program, rather than toward participants alone. Evaluating these results implies that the course has a well stated purpose and objective. Evaluating course and program results can use all other evaluations (reaction of participants, learning, behavior changes) and additional instruments as well.

The questions are:

* how successful was the course as complete entity?

* how well does it contribute to the educational program of the institution as a whole?

To underscore, to attempt an answer to these questions there must be course objectives and program objectives. These objectives must clearly deal with who is to be trained, what information is to be imparted and what the end results are intended to be. The evaluation then consists of the analysis and interpretation of course results (questionnaires, tests, surveys, etc.) and matching them against course and program objectives.

Such an evaluation could involve a survey of observers or independent evaluators above and beyond the participants, instructors, or administrators. This kind of evaluation can hardly be quantitative in nature, however, some quantitative summaries can be used to support conclusions.

The conclusions from such a course and program evaluation can be used to make decisions which will lead to improvements in the course and implement any necessary changes dealing with effectiveness and efficiency of course and program conduct.

In conclusion, evaluation is an absolute necessity for making rational decisions on improvements and changes. Information consolidation is a user oriented information activity. A course in information consolidation, to have the largest impact, should also be user oriented. Evaluation helps to achieve that.

REFERENCES

[1] UNESCO. Study Report on the Role of Information Analysis Centers in World Science Information Networks. First Meeting of the UNISIST Working Group on Information Analysis Centres. (Paris, 8-12 October 1974). Paris: UNESCO; 1975 (UNISIST/I/IAC/75/1.4).

[2] UNESCO. Symposium on Information Analysis and Consolidation, (Second Meeting, Colombo, Sri Lanka, 12-15 September 1978). Paris: UNESCO; 1979 (ED/79/WS/102).

[3] UNESCO. Final Report of the UNISIST Working Group on Information Analysis and Consolidation (Third Meeting). (Kuala Lumpur, Malaysia, 12-16 September 1983). Paris: UNESCO; 1984 (PGI-83/CONF.609/COL.1).

[4] United Nations Conference on Science and Technology for Development (UNCSTD). Report. (Vienna, 21-31 August 1979). New York: United Nations (A/CONF.81/16).

[5] UNESCO. International Symposium on Harmonization of Education and Training Programmes in Information Science, Librarianship, and Archival Studies. Final Report. Paris: UNESCO; 1984. (PGI-84/CONF.801/COL.4)

[6] Saracevic, T. and Wood, J. Consolidation of Information. A Handbook on Evaluation Restructuring and Repackaging of Scientific and Technical Information. Paris: UNESCO; 1981 (PGI-81/WS/16).

[7] Mazumdar, A. Consolidation of Information: Biogas Handbook. Paris: UNESCO, 1982 (PGI/82/WS/19).

[8] Rastogi, T. Consolidation of Information: Windpump Handbook. Paris: UNESCO; 1982 (PGI/82/WS/17).

[9] Tata Energy Research Institute. Consolidation of Information: Cooking Stoves Handbook. Paris: UNESCO; 1982 (PGI/82/WS/20).

[10] Tata Energy Documentation and Information Centre. Biogas Technology - A Manual for Decision Makers. Bombay: Tata Energy Research Institute and UNESCO; 1983.

[11] Tata Energy Documentation and Information Centre. Biogas Technology. A Manual for Extension Workers. Bombay: Tata Energy Research Institute and UNESCO; 1983.

[12] Seetharama, S. Guidelines for the Establishment of Information Consolidation Units. Paris: UNESCO; 1984 (PGI-84/WS/19).

[13] Valls, J. Information Services for Developing Countries. Bangkok: Asian Institute of Technology; 1983. (ISBN 9748200132)

[14] Saracevic, T. "Processes and Problems in Information Consolidation." Information Processing and Management 22(1):45-60; 1986.

[15] Guinchat, C. and Menou, M. General Introduction to the Techniques of Information and Documentation Work. Paris: UNESCO; 1983. (ISBN 92-3-101860-4)

[16] Rogers, E.M. Diffusion of Innovations. 3rd ed. New York: Free Press; 1983.

[17] Dervin, B. and Nilan, M. "Information Needs and Uses." In: Williams, M. ed. Annual Review of Information Science and Technology, vol. 21. Chicago, Ill.: Knowledge Industry; 1986. (ISBN 0-86729-175-3)

[18] Belkin, N.J. and Vickery, A. Interaction in Information Systems. London: The British Library; (Library and Information Research Report 35); 1985. (ISBN 0-7123-3050-X)

[19] Busha, C.H. and Harter, S.P. Research Methods in Librarianship, Techniques and Interpretation. New York: Academic Press; 1980. (ISBN 0-12-147550-6)

[20] Lengenfelder, H. Libraries, Information Centers and Databases in Science and Technology. Munich: Sauer; 1984. (ISBN 3-598-10533-9)

[21] Saffady, W. Video-Based Information Systems; A Guide for Education, Business, Library and Home Use. Chicago: American Library Assoc.; 1985. (ISBN 0-8389-0425-4)

[22] Rowley, J.E. and Turner, C.M.D. Dissemination of Information. Boulder, CO: Westview, 1978. (ISBN 0-891588302)

[23] Kotler, P. Marketing for Nonprofit Organizations. 2nd ed. Englewood Cliffs, N.J.: Prentice Hall; 1982. (ISBN 0-13-556142-6)

[24] Cronin, B. ed. The Marketing of Library and Information Services. (Aslib Reader Series v. 4). London: Aslib; 1981. (ISBN 0-85-142153-9)

[25] Yates, B. ed. Marketing of Inforamtion Services. (Proceedings of the Unesco Regional Workshop, Camberra, December, 1983) Australia National Commission for Unesco. 1983. (ISBN 0-642-99315-7)

[26] Canada, International Development Research Centre.

Specialized Information Analysis Centres in International Development. Ottawa: IDRC, 1984 (IDRC - MR94e).

[27] Webb, S.P. Creating an Information Service. London: ASLIB; 1985. (ISBN 0-85142-186-5)

[28] Roberts, S.A. Costing and the Economics of Library and Information Services. London: ASLIB; 1984. (ISBN 0-85142-177-6)

[29] Lancaster, F.W. Guidelines for the Evaluation of Training Courses, Workshops and Seminars. Paris: UNESCO, Bureau of Studies and Programming; 1983. (BEP-83/WS/3).

APPENDIX

A SELECTED LIST OF INFORMATION ANALYSIS CENTERS AND INFORMATION CONSOLIDATION UNITS IN DIFFERENT SUBJECTS AND DIFFERENT REGIONS OF THE WORLD

Appropriate Health Resources and Technologies Action Group
85 Mary Bone High Street
London W1M 3DE
UNITED KINGDOM

Asian Institute of Technology
(four information centers listed below)
P.O. Box 2754
Bangkok
THAILAND

(a) Asian Information Center for Geotechnical Engineering
(b) Environmental Sanitation Information Center
(c) International Ferrocement Information Center
(d) Renewable Energy Resources Information Center

Bee Information Centre
International Bee Research Association (IBRA)
Hill House, Gerrards Cross
Bucks SL9 ONR
UNITED KINGDOM

Biodeterioration Centre
University of Aston in Birmingham
St. Peter's College
College Road, Saltley
Birmingham B8 3TE
UNITED KINGDOM

Brazilian Institute for Information in Science and Technology
SCRN 708/9 Bloco B Loja 18 no. 30
70.740 Brasilia, D.F.
BRAZIL

Cambridge Crystallographic Data Centre
University Chemical Laboratory
Lensfield Road
Cambridge CB2 1EW
UNITED KINGDOM

Centro Internacional de Agricultura Tropical
(two centers listed below)
Apartado Aerea 6713
Cali
COLOMBIA

(a) Cassava Information Center
(b) Bean Information Center

Clearinghouse on Development Communication
1414 22nd Street, N.W.
Washington, D.C. 20037
USA

Coconut Information Centre
Coconut Research Board
Bandirippuwa Estate
Lunuwila
SRI LANKA

Department of Extension Education
Section Information Science and Technical Writing
Agricultural University
Hollandseweg 1
6706 KN Wageningen
NETHERLANDS

Electronic Properties Information Center
Purdue University
2595 Yeager Road
West Lafayette, IN 47906
USA

Energy and Environment Information Center
525 Market Street, Mezzanine
San Francisco, CA 94105
USA

Faba Beans Information Centre
The International Center for Agricultural Research
in the Dry Areas (ICARDA)
P.O. Box 5466
Aleppo
SYRIA

Information and Documentation Centre in Agroforestry
International Council for Research in Agroforestry (ICRAF)
P.O. Box 30677
Nairobi
KENYA

INFOTEC
Information and Technological Assistance for Information
in Industry
San Lorenzo 153, 11o piso
Col. Del Valle - B. Juarez
03100 Mexico D.F.
MEXICO

Institute of Electrical Research
Department of Technical Information
Apartado Postal 1239
Cuernavaca, Morelos
MEXICO

Institute of Scientific and Technical Information of China
P.O. Box 640
Beijing
PEOPLE'S REPUBLIC OF CHINA

International Centre for Diarrhoeal Disease Research,
Bangladesh (ICDDR,B)
G.P.O. Box 128
Dacca 2
BANGLADESH

International Cotton Advisory Committee
Technical Information Section
1225 19th Street N.W. Suite 650
Washington, D.C. 20036
U.S.A.

International Grain Legume Information Centre
International Institute of Tropical Agriculture (IITA)
Oyo Road
PMB 5320
Ibadan
NIGERIA

International Irrigation Information Center (IIIC)
P.O. Box 8500
Ottawa
CANADA

Internation Irrigation Information Centre (IIIC)
P.O. Box 49
50250 Bet Dagan
ISRAEL

International Reference Centre for Avian
Haematozoa (IRCAH)
Memorial University of Newfoundland
St. John's, Newfoundland, A1B 3X7
CANADA

International Service for National Agricultural Research
P.O. Box 93375
2509 AJ The Hague
NETHERLANDS

International Technical Information Network
Office of the Director, Developing Countries Staff
Suite 620, 425 13th Street, N.W.
Washington, D.C. 20004
U.S.A.

Lentil News and Information Service
Crop Development Centre
University of Saskatchewan
Saskatoon, Saskatchewan S7N 0W0
CANADA

Machinability Data Center
Metcut Research Associates, Inc.
3980 Rosslyn Drive
Cincinnati, OH 45209
U.S.A.

Mechanical Properties Data Center
Battelle Laboratories
505 King Avenue
Columbus, OH 43201
U.S.A.

Metals and Ceramics Information Center
Battelle Laboratories
505 King Avenue
Columbus, OH 43201
U.S.A.

Nondestructive Testing Information and Analysis Center
Southwest Research Institute
6620 Culebra, P.O. Drawer 28510
San Antonio, TX 78284
U.S.A.

Regional Centre for Technology Transfer
Manickvelu Mansions
49 Palace Road, Post Box No. 115
Bangalore 560 052
INDIA

Rice Information Center
International Rice Research Institute
Los Banos
PHILIPPINES

Rubber Information Centre
Rubber Research Institute of Malaysia
3 1/2 Mile, Jalan Ampang
P.O. Box 150
Kuala Lumpur 16-03
MALAYSIA

Small Industry Extension Training Institute
Yousufguda
Hyderabad 500 045
INDIA

Social Science Information and Documentation Center
Royal Netherlands Academy of Arts and Sciences
Amsterdam
NETHERLANDS

Sorghum and Millets Information Centre
International Crops Research Institute for the
Semi-Arid Tropics (ICRISAT)
ICRISAT Patancheru Post Office
Andhra Pradesh 502, 324
INDIA

Tata Energy Research Institute Documentation Centre
24, Homi Mody Street
Bombay 400 023
INDIA

Technical Assistance Information Clearing House
American Council of Voluntary Agencies for Foreign
Services, Inc. (ACVAFS)
200 Park Avenue South
New York, NY 10003
U.S.A.

Technical Information Service
National Research Council of Canada
Ottawa, Ontario K1A 053
CANADA

Technonet Asia (Asian Network for Industrial
Information and Extension)
Room 703, RELC International House
30 Orange Grove Road
Tanglin P.O. Box 160
SINGAPORE 9124

Thermophysical and Electronic Properties
Information Analysis Center
Purdue University
2595 Yeager Road
West Lafayette, IN 47906
U.S.A.